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# New England Wind Project Draft Environmental Impact Statement: Appendices

December 2022

Bureau of Ocean Energy Management

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# Appendix A
# Required Environmental Permits and Consultations

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# Table of Contents



# List of Tables

## Abbreviations and Acronyms

| | |
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| ACHP | Advisory Council on Historic Preservation |
| BA | Biological Assessment |
| BO | Biological Opinion |
| BOEM | Bureau of Ocean Energy Management |
| CFR | Code of Federal Regulations |
| COP | Construction and Operations Plan |
| EFH | essential fish habitat |
| EIS | Environmental Impact Statement |
| ESA | Endangered Species Act |
| ITA | Incidental Take Authorization |
| LOA | Letters of Authorization |
| MMPA | Marine Mammal Protection Act |
| MSA | Magnuson-Stevens Fishery Conservation and Management Act |
| NEPA | National Environmental Policy Act |
| NHL | National Historic Landmark |
| NHPA | National Historic Preservation Act |
| NMFS | National Marine Fisheries Service |
| NOI | Notice of Intent |
| OECC | offshore export cable corridor |
| Project | New England Wind Project |
| ROD | Record of Decision |
| Secretary | Secretary of the Interior |
| USC | U.S. Code |
| USCG | U.S. Coast Guard |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | U.S. Fish and Wildlife Service |
| WTG | wind turbine generator |

# A Required Environmental Permits and Consultations

## A.1 Introduction

This appendix discusses required permitting and public, agency, and tribal involvement in the preparation of the New England Wind Project (proposed Project) Environmental Impact Statement (EIS). This involvement included formal consultations, cooperating agency exchanges, and a public scoping comment period.

Table A.1-1 lists authorizations and permits; Section A.2.1 describes cooperating or participating federal agencies. The Bureau of Ocean Energy Management (BOEM) has completed the following interagency milestones to date for the proposed Project:

- Concurrence on Permitting Timetable: May 14, 2020
- Finalize Purpose and Need: June 16, 2021
- Issuance of Notice of Intent (NOI) to prepare an EIS: June 30, 2021
- Complete First Public Scoping period: August 29, 2021
- Issuance of Notice of Additional Public Scoping and [proposed Project] Name Change: November 22, 2021
- Complete Second Public Scoping period: December 22, 2021
- Finalize Draft EIS Alternatives: November 1, 2022

## A.2 Other Federal and State Review

Table A.1-1 provides a discussion of other required federal and state reviews, including legal authority, jurisdiction of the agency, and the regulatory process involved.

### A.2.1 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 guidelines, qualified agencies and governments are those with "jurisdiction by law" or "special expertise" (Code of Federal Regulations, Title 40, Section 1501.8 [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 process with a written summary of expectations, including time schedules and critical action dates, milestones, responsibilities, scope, detail of cooperating agencies' contributions, and availability of pre-decisional information.

Table A.1-1 lists cooperating agency status. Section A.2.1 provides more specific details regarding federal agency roles and expertise.

**Table A.1-1: Cooperating Agencies, Required Permits, and Consultations for the Proposed Project**

| Agency/Regulatory Authority | Permit/Approval | Status |
|---|---|---|
| **Federal** | | |
| BOEM (lead federal agency) | COP Approval / ROD | COP filed with BOEM July 2, 2020<br>Revised COP filed June 28, 2021<br>Revised COP filed December 17, 2021<br>COP Addendum filed April 22, 2022 |
| | Site Assessment Plan Approval | Not required |
| | NEPA Environmental Review | Initiated by BOEM June 30, 2021 |
| | Consultation under Section 7 of the ESA with NMFS and USFWS, coordination with the states under the Coastal Zone Management Act, government-to-government tribal consultations, consultation under Section 106 of the NHPA, and consultation with NMFS for EFH | NMFS ESA consultation package submitted September 7, 2022<br>NMFS EFH consultation request submitted September 7, 2022<br>USFWS ESA consultation request anticipated December 23, 2022 |
| BSEE | Oil Spill Response Plan | To be filed |
| | Facility Design Report and Fabrication and Installation Report | To be filed |
| | Safety Management Plan | To be filed |
| Federal Aviation Administration | No Hazard Determination (for activities at construction staging areas and vessel transits, if required) | To be filed |
| NMFS | Letter of Authorization | Letter of Authorization request notice of receipt published in *Federal Register* August 22, 2022 Volume 87, Issue 161, p. 51345 |
| | ITA | Permit application deemed complete July 20, 2022 |
| U.S. Army Corps of Engineers | CWA Section 404 Permit (required for fill activities in waters of the U.S. including redeposition of dredged material in cable trenches and placement of cable protection)<br>Rivers and Harbors Act of 1899 Section 10 Individual Permit (required for structures and work within navigable waters and for structures on the OCS) | Individual Permit Application/ENG Form 4345/Joint Application Form submitted August 1, 2022<br>Complete Individual Permit Application submitted December 8, 2022<br>Section 404/10 application anticipated December 23, 2022. |
| USCG | Private Aid to Navigation authorization | To be filed |

| Agency/Regulatory Authority | Permit/Approval | Status |
|---|---|---|
| USEPA | USEPA permits under Section 316(b) of the CWA, including the National Pollutant Discharge Elimination System Permit(s) | To be filed |
| | OCS Air Permit | NOI submitted January 28, 2022<br>Initial permit application filed October 7, 2022 |
| **Regional** | | |
| ISO New England | Interconnection Authorization | Phase 1: interconnection request queue position #700 submitted December 15, 2017<br>Phase 2: interconnection request(s) under review |
| **State** | | |
| Massachusetts Executive Office of Environmental Affairs | Certificate of the Secretary of Energy and Environmental Affairs on the Final Environmental Impact Report | Phase 1: Final Environmental Impact Report certificate for New England Wind 1 Connector issued January 28, 2022<br>Phase 2: Environmental notification form filed September 30, 2022 |
| Massachusetts Energy Facilities Siting Board | General Law Ch. 164, § 69 Approval | Phase 1: Petition filed on May 28, 2020.<br>Phase 2: Petition filed on November 1, 2022 |
| Massachusetts Department of Public Utilities | General Law Ch. 164, § 72, Approval to Construct<br>General Law Ch. 40A, § 3 Zoning Exemption (if needed) | Phase 1: Petitions filed on May 28, 2020<br>Phase 2: To be filed |
| Massachusetts Department of Environmental Protection | Chapter 91 Waterways License and Dredge Permit / Water Quality Certification (Section 401 of the CWA) | Phase 1: Application filed May 5, 2022<br>Phase 2: To be filed |
| | Approval of Easement (Drinking Water Regulations) | Phase 1: Not applicable<br>Phase 2: To be filed (if needed) |
| Massachusetts Division of Marine Fisheries | Letter of Authorization and/or Scientific Permit (for surveys and pre-lay grapnel run) | To be filed |
| Massachusetts Department of Transportation | Non-Vehicular Access Permits | To be filed |
| | Rail Division Use and Occupancy License (if needed) | To be filed (if needed) |
| Massachusetts Board of Underwater Archaeological Resources | Special Use Permit | Special Use Permit 17-003 Renewal Application Permit approved February 26, 2021<br>Permit 17-003 renewal approved February 26, 2021 |

| Agency/Regulatory Authority | Permit/Approval | Status |
|---|---|---|
| National Heritage and Endangered Species Program | Conservation and Management Permit (if needed) | Phase 1: Massachusetts ESA Determination issued April 1, 2022, with conditions and will not result in a Take of state-listed species<br>Phase 2: To be filed (if needed) |
| Massachusetts Historical Commission | Archaeological Investigation Permits (950 Code of Massachusetts Regulation § 70.00) | BOEM consultation initiated June 30, 2021<br>Phase 1:<br>Reconnaissance survey permit application filed May 4, 2020<br>State Archaeologist's Permit #4006 for Reconnaissance Survey issued May 12, 2020; amended and extended March 2, 2021<br>Phase 2:<br>Intensive survey permit application filed August 18, 2022<br>State Archaeologist's Permit #4227 for Intensive Survey issued October 4, 2022 |
| Massachusetts Office of Coastal Zone Management/Rhode Island Coastal Resources Management Council | Federal Consistency Determination (15 CFR § 930.57) | Included as COP Appendix III-S (Epsilon 2022)<br>Massachusetts Office of Coastal Zone Management consistency review began: September 14, 2022; consistency decision due by March 14, 2023 |
| **Regional** | | |
| Cape Cod Commission (Barnstable County) | Development of Regional Impact Review | Phase 1: Application filed June 10, 2022<br>Phase 2: To be filed |
| Martha's Vineyard Commission | Development of Regional Impact Review | Phase 1: Application filed June 17, 2022<br>Phase 2: To be filed |
| **Local** | | |
| Barnstable Conservation Commission | Order of Conditions (Massachusetts Wetlands Protection Act and municipal wetland non-zoning bylaws) | Phase 1: NOI filed April 29, 2022<br>Phase 2: To be filed |
| Barnstable Department of Public Works and/or Town Council | Street Opening Permits/Grants of Location | To be filed |
| Barnstable Planning/Zoning | Zoning approvals as necessary | To be filed |
| Edgartown Conservation Commission | Order of Conditions (Massachusetts Wetlands Protection Act and municipal wetland non-zoning bylaws) | Phase 1: NOI filed March 23, 2022<br>Phase 2: To be filed |

| Agency/Regulatory Authority | Permit/Approval | Status |
|---|---|---|
| Nantucket Conservation Commission | Order of Conditions (Massachusetts Wetlands Protection Act and municipal wetland non-zoning bylaws) | Phase 1: Order of Conditions issued May 16, 2022<br>Phase 2: To be filed |

BOEM = Bureau of Ocean Energy Management; BSEE = Bureau of Safety and Environmental Enforcement; CFR = Code of Federal Regulations; COP = Construction and Operations Plan; CWA = Clean Water Act; EFH = essential fish habitat; ESA = Endangered Species Act; ITA = Incidental Take Authorization; NEPA = National Environmental Policy Act; NHPA = National Historic Preservation Act; NMFS = National Marine Fisheries Service; NOI = Notice of Intent; OCS = Outer Continental Shelf; ROD = Record of Decision; USCG = U.S. Coast Guard; USEPA = U.S. Environmental Protection Agency; USFWS = U.S. Fish and Wildlife Service

### A.2.1.1 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 their jurisdiction by law and special expertise. As applicable, permits and authorizations are issued pursuant to the Marine Mammal Protection Act (MMPA), as amended (U.S. Code, Title 16, Section 1316 et seq. [16 USC § 1361 et seq.]); the regulations governing the taking and importing of marine mammals (50 CFR Part 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 Parts 222–226). In accordance with 50 CFR Part 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 Part 600 when proposed actions may adversely affect essential fish habitat (EFH). The MMPA is the only authorization for NMFS that requires NEPA compliance, which will be met via adoption of BOEM's EIS and issuance of the Record of Decision (ROD).

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' 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 Authorizations (ITA) under the MMPA, as amended (16 USC § 1361 et seq.) and issue an ITA if appropriate. In conjunction with the Construction and Operations Plan (COP), Park City Wind, LLC (the applicant) submitted an application to NMFS for an ITA for take (as defined by the MMPA) [1] of marine mammals incidental to proposed Project construction and associated activities. The decision to issue an ITA 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 Council on Environmental Quality (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.

### A.2.1.2 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 their jurisdiction by law and special expertise. Pursuant

[1] The term "take" means "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal" (16 USC § 1362(3)(13)). 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). Harassment, as defined in the MMPA for non-military readiness activities (Section 3(8)(A)), is any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment) or any act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns (Level B harassment). Disruption of behavioral patterns includes, but is not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.

to a December 2020 Memorandum of Agreement between BOEM and BSEE, BSEE conducts activities, consults, and advises BOEM on safety and environmental enforcement for renewable energy projects. BSEE's authority of oversight of renewable energy on the Outer Continental Shelf (OCS) includes, but is not limited to, production, transportation, and transmission of energy, including oversight and enforcement of safety and environmental standards, and inspection of activities on leases, Project easements, rights-of-way, and rights-of-use.

#### A.2.1.3 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 fall under their jurisdiction by law and special expertise. After review of the application, the USCG will issue a Private Aids to Navigation approval for installation of the wind turbine generators (WTG), electrical service platforms, and measurement buoys to alert mariners to potential hazards to navigation. The applicant will also submit a request for a Local Notice to Mariners publication to the USCG prior to vessel mobilization for construction activities.

#### A.2.1.4 U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (USEPA) 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 their jurisdiction by law and special expertise. The USEPA is responsible for issuing an OCS permit for the proposed Project under the Clean Air Act.

#### A.2.1.5 U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers 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 their 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 (CWA). As an offshore wind energy project, the fill activities associated with the proposed Project are water dependent. These include the inter-array cable armoring at the base of the WTG foundations, protective cable armoring for the export cable, dredging planned for the potential operations and maintenance facility at Montauk, and construction of temporary cofferdams. 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 ROD.

#### A.2.1.6 U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) is serving as a cooperating agency for the proposed 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 Section A.2.2.2 for a summary of the ESA consultation to date with the USFWS.

#### A.2.1.7 National Park Service

The National Park Service is serving as a participating agency because there are multiple important National Park Service resources within the proposed Project vicinity, including the Gay Head Lighthouse and the Nantucket National Historic Landmark (NHL). There may also be Land and Water Conservation Fund State and Local Assistance sites impacted if more export cable locations are set. Should any potential impacts on National Park Service units or program lands be identified that require a National Park Service permit, the National Park Service will request a change to cooperating agency status under "jurisdiction by law" pursuant to 40 CFR § 1501.8.

### A.2.2 Consultations

The following section provides a summary and status of each consultation (ongoing, complete, and the opinion or finding of each consultation). The BSEE, U.S. Army Corps of Engineers, and USEPA are co-action agencies for the ESA, MSA, and National Historic Preservation Act (NHPA) consultations.

#### A.2.2.1 Coastal Zone Management Act

The Coastal Zone Management Act requires that federal actions within and outside the coastal zone that have planned 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 to the maximum extent practicable. The applicant voluntarily submitted a federal consistency certification with the Rhode Island Coastal Resources Management Council on May 17, 2022, and to the Massachusetts Office of Coastal Zone Management on September 14, 2022, per 15 CFR § 930.57. The proposed Project COP (Epsilon 2022) provided the necessary data and information under 15 CFR § 930.58. Concurrence of the State of Rhode Island and the Commonwealth of Massachusetts is required before BOEM may approve, or approve with conditions, the COP in accordance with 30 CFR § 585.628(f) and 15 CFR § 930.130(1).

#### A.2.2.2 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 may affect a protected species or its critical habitat, that agency is required to consult with either NMFS or USFWS, depending upon the jurisdiction. 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 USFWS. BOEM has initiated consultation on the proposed activities considered in this Draft EIS with both NMFS and USFWS for listed species under their respective jurisdictions. According to the NMFS and USFWS Biological Assessments (BA), there is designated critical habitat in the Southern Wind Development Area for nine species. The sections below describe the status of consultations with NMFS and USFWS.

**National Marine Fisheries Service**

BOEM submitted a BA for the proposed Project to NMFS and requested formal consultation under Section 7 of the ESA on September 7, 2022 (BOEM 2022a). The BA assesses impacts from all aspects of the proposed Project, including construction, operation, maintenance, and decommissioning on marine ESA-listed species (non-marine species consultation is discussed below). Formal consultation will be completed with the issuance of a Biological Opinion (BO) after Final EIS issuance. The scope of the BA and BO covers the entirety of potential effects on ESA-listed species and designated critical habitat associated with the proposed Project. The BA evaluated four mammals that may occur in the geographic analysis area for the proposed Project (EIS Section 3.7, Marine Mammals) and may be affected by the Proposed Action, including the North Atlantic right whales (*Eubalaena glacialis*), fin whales (*Balaenoptera physalus*), sei whales (*Balaenoptera borealis borealis*), and sperm whales (*Physeter microcephalus*). Of particular importance is the occurrence of the critically endangered North Atlantic right whales known to frequent the area at certain times of year. These species rely on OCS habitats for a variety of important life functions, including feeding, breeding, nursery grounds, socializing, and migration. Other species that may occur in the Action Area and may be affected by the Proposed Action include the Northwest Atlantic Distinct Population Segment of loggerhead sea turtles (*Caretta caretta*), North Atlantic Distinct Population Segment of green sea turtles (*Chelonia mydas*), leatherback sea turtles (*Dermochelys coriacea*), and Kemp's ridley sea turtles (*Lepidochelys kempii*). BOEM, NMFS, and the applicant will further consult and coordinate to ensure that effects from post-construction monitoring activities are mitigated to the level of least practicable adverse impact. The Final EIS analysis of effects and conclusions of the final BO will be incorporated by reference and summarized into the Final EIS. The Draft BA is available at https://www.boem.gov/renewable-energy/state-activities/new-england-wind-formerly-vineyard-wind-south.

**U.S. Fish and Wildlife Service**

On November 30, 2021, in preparation of the NEPA process and the BA for non-marine species such as birds and bats, BOEM used USFWS's Information for Planning and Consultation system (USFWS 2021) to determine if any ESA-listed, proposed, or candidate species may be present in the onshore and offshore proposed Project area. The report identified four ESA-listed species with potential to occur in the proposed Project area: northern long-eared bat (*Myotis septentrionalis*), Piping Plover (*Charadrius melodus*), Rufa Red Knot (*Calidris canutus rufa*), and Roseate Tern (*Sterna dougallii dougallii*) (USFWS 2021).

On September 7, 2022, BOEM submitted a BA to USFWS (BOEM 2022b); consultation with USFWS is ongoing and will be completed prior to issuance of the ROD. The BA assesses the impacts of all aspects of the proposed Project, including construction, operation, maintenance, and decommissioning on USFWS-listed species. The analysis of effects and conclusions of the BA will be incorporated by reference and summarized in the Final EIS. Based on the above-described outputs of the Information for Planning and Consultation tool, BOEM determined that tree clearing activities for the onshore substation complied with the USFWS's January 5, 2016, Programmatic BO, which satisfied USFWS responsibilities relative to the northern long-eared bat for this action under ESA Section 7(a)(2) (USFWS 2016). Consultation with USFWS is ongoing.

#### A.2.2.3 Government-to-Government Tribal Consultations

Executive Order 13175 commits federal agencies to engage in government-to-government consultation with tribes when federal actions have tribal implications. 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. BOEM's tribal consultation policy 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 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 other engagement.

On June 30, 2021, BOEM issued the NOI to prepare an EIS for the proposed Project in the *Federal Register* (Volume 86, Issue 123 [June 30, 2021] p. 34782 [86 Fed. Reg. 123 p. 34782]) Subsequently, BOEM sent a letter to consulting parties notifying them of the NOI issuance. The purpose of the letter was to share information regarding the NOI, including information about public scoping meetings, provide detail on how to make comments on the NOI, and invite the tribes to participate in a group consultation meeting to discuss public scoping information.

BOEM invited Tribal Historic Preservation Officers to virtual NEPA scoping meetings on July 18, July 23, and/or July 26, 2021. During these meetings BOEM shared information regarding proposed alternatives and cultural resources in the proposed Project area, including mitigation and monitoring measures to avoid, minimize, or mitigate any adverse effects on cultural resources. Subsequently, BOEM prepared, approved, and distributed the *Scoping Summary Report* (BOEM 2022c) to cooperating agencies and Tribal Historic Preservation Officers.

BOEM continues to consult with these and other tribes on the proposed Project, as well as other developments in offshore wind.

### A.2.2.4 National Historic Preservation Act

Section 106 of the NHPA (54 USC § 306108) and its implementing regulations (36 CFR Part 800) require federal agencies to consider the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment. BOEM has determined that the proposed Project is an undertaking subject to Section 106 review. The construction of WTGs and electrical service platforms, installation of electrical support cables, and development of staging areas are ground- or seabed-disturbing activities that may adversely affect archaeological resources. The presence of WTGs may 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 National Register of Historic Places, the proposed Project may adversely affect those historic properties. 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* (BOEM 2022c), available on BOEM's Project-specific website, summarizes comments on historic preservation issues.[2]

On June 14, 2021, BOEM initiated consultation on the proposed Project with eight federally recognized tribes: the Delaware Nation, the Delaware Tribe of Indians, the Mashantucket (Western) Pequot Tribal Nation, the Mashpee Wampanoag Tribe of Massachusetts, the Mohegan Indian Tribe of Connecticut, the Narraganset Indian Tribe, the Shinnecock Indian Nation of New York, and the Wampanoag Tribe of Gay Head (Aquinnah). Additional notifications were sent on November 22, 2021, with the design changes and project name change, following the additional scoping period. Additionally, parties were again invited to participate after BOEM held an initial NHPA Section 106 consultation meeting virtually on March 3, 2022.

On June 30, 2021, BOEM informed the federally recognized tribes of its intent to use the NEPA process to fulfill its review obligations for the proposed Project under NHPA Section 106 in lieu of the procedures set forth in 36 CFR §§ 800.3 through 800.6. Using the NEPA process is permitted by 36 CFR § 800.8(c), which requires federal agencies to assess the effects of projects on historic properties. Additionally, BOEM informed its Section 106 consultation by seeking public comment and input through the NOI regarding the identification of historic properties or potential effects on historic properties from activities associated with approval of the COP.

BOEM held government-to-government consultation meetings with the Delaware Nation, the Delaware Tribe of Indians, the Mashantucket (Western) Pequot Tribal Nation, the Mashpee Wampanoag Tribe of Massachusetts, and the Wampanoag Tribe of Gay Head (Aquinnah) on August 13, 2021, and May 26, 2022. BOEM held a government-to-government consultation meeting with the Delaware Nation, the Mashantucket (Western) Pequot Tribal Nation, the Mashpee Wampanoag Tribe of Massachusetts, and the Wampanoag Tribe of Gay Head (Aquinnah) on November 4, 2021. BOEM held a government-to-government consultation meeting with the Wampanoag Tribe of Gay Head (Aquinnah) on May 2, 2022. This meeting was followed by a subsequent meeting on June 1, 2022. Additionally, on June 2, 2022, the BOEM Director met in-person with the Mashpee Wampanoag Tribe of Massachusetts to provide information to the Tribal Council.

[2] https://www.boem.gov/renewable-energy/state-activities/new-england-wind-formerly-vineyard-wind-south

In these letters and consultation meetings, BOEM requested information from consulting parties on historic properties that may be potentially affected by the proposed undertaking.

Due to the presence of the Nantucket NHL within the area of potential effect for the Proposed Action, BOEM is currently in the process of completing its requirements under Section 110(f) of the NHPA (54 USC § 306107) and 36 CFR § 800.10(a). Section 110(f) of the NHPA requires federal agencies, "to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to NHLs that may be directly and adversely affected by an undertaking." Section 110(f) of the NHPA and 36 CFR § 800.10 also require federal agencies to request that the ACHP participate in the consultation, require the agency official to notify the Secretary of the Interior (Secretary) of any consultation involving an NHL, and invite the Secretary to participate in the consultation where there may be an adverse effect.

To comply with Section 110(f) of the NHPA, BOEM has analyzed, and continues to analyze, alternatives and mitigation and monitoring measures to minimize adverse visual effects of the Proposed Action on the Nantucket NHL. To reduce or minimize daytime visual effects, the Proposed Action would use paint schemes that lower the visual contrast of the WTGs against the background, and to minimize nighttime effects, would use an aircraft detection light system. BOEM is currently considering additional mitigation and monitoring measures in consultation with consulting parties to further mitigate the adverse effects as part of the NHPA Section 106 review of the Proposed Action.

In addition to BOEM's actions to minimize harm to the Nantucket NHL, BOEM requested ACHP participation in the NHPA Section 106 review for the Proposed Action in a June 16, 2021, letter. The ACHP accepted BOEM's request and has continued to participate throughout the NHPA Section 106 review process. BOEM, in consultation with consulting parties, will make final determinations on mitigation and monitoring measures to resolve adverse effects on the Nantucket NHL as part of the NHPA Section 106 review for the Proposed Action. ACHP will then review the proposed mitigation and monitoring measures to resolve adverse effects, as well as consulting party comments, fulfill their role in Section 110(f).

To comply with the requirement to notify the Secretary of any consultations involving an NHL, BOEM has consulted with the National Park Service's NHL Program.[3] BOEM requested that the National Park Service participate in the NHPA Section 106 review for the Proposed Action in a June 14, 2021, letter, and the National Park Service began participating in the NHPA Section 106 review consultation at that time. BOEM will continue to consult with the National Park Service throughout the NHPA Section 106 review consultations for the Proposed Action.

#### A.2.2.5 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 MSA can be found in 50 CFR Part 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 MSA. Certain OCS activities authorized by BOEM may result in adverse effects on EFH and, therefore, require consultation with NMFS. BOEM developed an EFH Assessment concurrent with the Draft EIS and transmitted the findings of that EFH Assessment to NMFS on September 7, 2022. The Final EIS will summarize and discuss the assessment's key findings and will incorporate the entire

[3] The Secretary has delegated the authority for responsibility under 36 CFR § 800.10(c) to the National Park Service NHL Program.

assessment by reference. BOEM's EFH Assessment determined that the Proposed Action would adversely affect the quality and quantity of EFH for several species of managed fish.

#### A.2.2.6 Marine Mammal Protection Act

Section 101(a) of the MMPA (16 USC § 1361 et seq.) 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) (l), (a)(2)). Sections 101(a)(5)(A) and (D) of the MMPA provide 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 findings are made and statutory and regulatory procedures are met. ITAs may be issued as either (1) regulations and associated Letters of Authorization (LOA).[4] LOAs may be issued for up to a maximum period of 5 years. NMFS has also promulgated regulations to implement the provisions of the MMPA governing the taking and importing of marine mammals (50 CFR Part 216) and has published application instructions that prescribe the procedures necessary to apply for an ITA. U.S. citizens seeking to obtain authorization for the incidental take of marine mammals under NMFS' jurisdiction 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.

In July 2022, the applicant submitted a request to NMFS for an LOA for non-lethal take of marine mammals, pursuant to MMPA Section 101(a)(5)(A), for the take of marine mammals incidental to the proposed Project's construction. While reviewing the applicant's request for an LOA, NMFS has an independent responsibility to comply with NEPA. NMFS is relying on the information and analyses in this EIS, as NMFS intends to adopt this EIS and sign a ROD, if NMFS determines this EIS to be sufficient to support NMFS's separate Proposed Action and decision under the MMPA.

### A.2.3 Development of Environmental Impact Statement

This section provides an overview of the development of the Draft EIS, including public scoping, cooperating agency involvement, and distribution of the Draft EIS for public review and comment.

#### A.2.3.1 Scoping

On June 30, 2021, BOEM issued a 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 (Notice of Intent to Prepare an Environmental Impact Statement for the Vineyard Wind South Project Offshore Massachusetts (since renamed the New England Wind Project) in the *Federal Register* (86 Fed.

[4] Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant).

Reg. 123 p. 34782)). The NOI commenced the public scoping process for identifying issues and potential alternatives for consideration in the EIS.

BOEM held three virtual public scoping meetings on July 19, July 23, and July 26, 2021, to solicit feedback and identify issues and potential alternatives for consideration in the EIS. Throughout the scoping process, federal agencies; state, local, and tribal governments; and the general public had the opportunity to help BOEM identify potential 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 and monitoring measures to be analyzed in the EIS, as well as provide additional information. BOEM used the NEPA scoping process to initiate the Section 106 consultation process under the NHPA (54 USC § 300101 et seq.), as permitted by 36 CFR § 800.2(d)(3), and sought public input through the NOI regarding historic properties and potential effects on historic properties from activities associated with the COP. BOEM also used this scoping process to begin informal ESA consultation. The formal scoping period lasted from June 30 through July 30, 2021.

BOEM received comment submissions on the NOI via the following mechanisms:

- Electronic submissions received via www.regulations.gov on docket number BOEM-2022-0070
- Electronic submissions received via email to a BOEM representative
- Comments submitted verbally at each of the public scoping meetings

On August 19, 2021, the applicant (then operating as Vineyard Wind, LLC) notified BOEM of the potential need to establish offshore export cable corridors (OECC) for Phase 2 of the proposed Project, beyond those previously identified in the COP. The applicant also notified BOEM of a change in the proposed Project's name, from the Vineyard Wind South Project to the New England Wind Project. On November 22, 2021, BOEM issued a Notice of Additional Public Scoping and Name Change to announce the project name change, and to assess the potential impacts of the Phase 2 OECC alternative routes (86 Fed. Reg. 222 [November 22, 2021] p. 66334). This notice commenced a second public scoping process from November 22 through December 22, 2021, that was similar in intent and purpose to the first scoping process, focusing on the newly proposed Phase 2 OECC alternative routes. BOEM posted information, including a video presentation to its website to provide supporting information on the Phase 2 OECC alternatives. BOEM received comments via www.regulations.gov during this second scoping period.

BOEM reviewed and addressed, as appropriate, all scoping comments (from both rounds of scoping) in the development of the Draft EIS and used the comments to identify alternatives for analysis. A *Scoping Summary Report* (BOEM 2022c) summarizing the submissions and the methods for analyzing them is available on BOEM's website at https://www.boem.gov/new-england-wind. In addition, all public scoping submissions received is available online at http://www.regulations.gov by typing "BOEM-2022-0070" 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, the NEPA process (including public engagement), socioeconomics, and planned actions (i.e., cumulative impacts).

### A.2.3.2 Distribution of the Draft Environmental Impact Statement for Review and Comment

The Draft EIS is available in electronic format for public viewing at https://www.boem.gov/renewable-energy/state-activities/new-england-wind-formerly-vineyard-wind-south. Hard copies and digital copies of the Draft EIS can be requested by contacting the Program Manager, Office of Renewable Energy in Sterling, Virginia. Publication of this Draft EIS initiates a 60-day comment period where government agencies, members of the public, and interested stakeholders can provide comments and input. BOEM will accept comments in any of the following ways:

- In hard copy form, delivered by mail, enclosed in an envelope labeled "New England Wind COP EIS" and addressed to Program Manager, Office of Renewable Energy, Bureau of Ocean Energy Management, 45600 Woodland Road, Sterling, Virginia 20166. Comments must be received or postmarked no later than February 21, 2023.
- Through the regulations.gov web portal by navigating to https://www.regulations.gov/ and searching for docket number "BOEM-2022-0070." Click the "Comment" button to the right of the document link. Enter your information and comment, then click "Submit."
- By attending one of the public hearings on the dates listed in the notice of availability and providing written or verbal comments. BOEM will hold three virtual public hearings to solicit feedback and identify issues for consideration in preparing the Final EIS.
- BOEM will use comments received during the public comment period to inform its preparation of the Final EIS, as appropriate. EIS distribution lists for the Project are provided in EIS Appendix N, List of Agencies, Organizations, and Persons to Whom Copies of the Statement Are Sent.

## A.3 References

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# Appendix B
# Supplemental Information and Additional Figures and Tables

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# Table of Contents



# List of Tables

## List of Figures

## Abbreviations and Acronyms

| | |
|---|---|
| °F | degree Fahrenheit |
| μPa | micropascal |
| $\mu Pa^2s$ | micropascal squared second |
| AMSL | above mean sea level |
| BA | Biological Assessment |
| BMP | best management practice |
| BOEM | Bureau of Ocean Energy Management |
| CFR | Code of Federal Regulations |
| COP | Construction and Operations Plan |
| CPT | cone penetrometer testing |
| dB | decibel |
| dB re 1 μPa | decibels referenced to 1 micropascal |
| EEZ | Exclusive Economic Zone |
| EFH | essential fish habitat |
| EIS | Environmental Impact Statement |
| $ER_{95\%}$ | 95th percentile exposure-based range |
| ESA | Endangered Species Act |
| ESP | electrical service platform |
| ETRB | Engineering and Technical Review Branch |
| FMP | Fisheries Management Plan |
| h/D | water depth divided by pile diameter |
| HFC | high-frequency cetacean |
| HRG | high-resolution geophysical |
| IPF | impact-producing factor |
| kJ | kilojoule |
| LFC | low-frequency cetacean |
| LOA | Letter of Authorization |
| MA | Massachusetts |
| MFC | sound exposure level over 24 hours |
| NA | not applicable |
| NARW | North Atlantic right whale |
| NCDC | National Climatic Data Center |
| NEFSC | Northeast Fisheries Science Center |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| OCS | Outer Continental Shelf |
| OECC | offshore export cable corridor |
| Pa | pascal |
| PBR | potential biological removal |
| PK | peak sound pressure level |
| PPW | pinnipeds in the water |
| Project | New England Wind Project |
| PTS | permanent threshold shift |
| RI | Rhode Island |
| RI/MA Lease Areas | Rhode Island and Massachusetts Lease Areas |
| RI DEM | Rhode Island Department of Environmental Management |
| SEL | sound exposure level |
| $SEL_{24h}$ | sound exposure level over 24 hours |
| S/h | scour depth divided by water depth |
| SPL | root-mean-square sound pressure level |
| SPUE | sightings per unit effort |

| | |
|---|---|
| SWDA | Southern Wind Development Area |
| TTS | temporary threshold shift |
| UME | unusual mortality event |
| USGS | U.S. Geological Survey |
| UXO | unexploded ordnance |
| VMS | vessel monitoring system |
| VTR | vessel trip report |
| WDA | Wind Development Area |
| WTG | wind turbine generator |

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# B Supplemental Information and Additional Figures and Tables

## B.1 Environmental and Physical Setting

This appendix discusses the physical, geological, and biological settings in the vicinity of the New England Wind Project (proposed Project). In addition, it addresses potential impacts on these settings as determined from field and laboratory studies within the United States (mainly from the Block Island Wind Farm) and from outside the United States. Although projects in the United States may utilize larger monopile foundations and larger turbines than those used in the well-studied projects of the North Sea, the basic science behind how monopile size, water depth, currents, and waves interact to affect local hydrodynamics and create seabed scour and other effects are well understood and applicable to projects in the United States. The Bureau of Ocean Energy Management (BOEM) recently compared the long-term monitoring results from Europe to monitoring results from the first project in U.S. waters (the Block Island Wind Farm) and found that benthic scour at the Block Island Wind Farm was minor. BOEM has gathered the information in this document through direct outreach and dialogue with European regulatory agencies and private industry partners, as well as by reviewing both peer-reviewed and gray literature.

### B.1.1 General Regional Setting

The proposed Project is located in southern New England and includes land areas in the Commonwealth of Massachusetts and adjacent nearshore and offshore waters. Figure B.1-1 shows the region surrounding the proposed Project.

The geologic history of the Atlantic coast of the United States is that of a passive margin, where the coastal mountains and continental sediments have been eroded over the millennia and deposited as thick layers of unconsolidated sediments in the Outer Continental Shelf (OCS). More recently in geologic time, periods of glaciation reworked, eroded, and deposited sediments along the northeastern Atlantic, leaving behind glacial formations offshore that include deep infilled channels, glacial moraine deposits, boulder fields, areas of highly consolidated sediments, and highly variable, heterogeneous conditions. Glacial moraines identified on the islands of Long Island (New York), Block Island (Rhode Island), Martha's Vineyard (Massachusetts), and Nantucket Island (Massachusetts) roughly connect through a series of offshore moraine deposits. Glacial deposits are found in and around BOEM lease areas off the coast of Rhode Island and Massachusetts and lease areas offshore New York. In areas in and around the glacial moraines, sediments are expected to be generally coarser grained, highly variable, and consolidated with erratics such as boulders deposited both on the seabed and in the subsurface.

The proposed Project's offshore cables would make landfall in south-central Cape Cod in Barnstable County. The Covell's Beach Landfall Site would be located within the Town of Barnstable, the largest community on Cape Cod; the Town of Barnstable includes forests, wetlands, ponds, protected open space, public use areas, low- to medium-density residential development, and some commercial and industrial uses along major roads. The Town of Barnstable management plan prioritizes preserving the historic character of the area and preserving natural resources (Town of Barnstable 2010). The proposed Project would also include office, storage, and port facilities on Martha's Vineyard. About 2 percent of Martha's Vineyard is zoned for commercial or industrial use, 40 percent is preserved from development, and nearly all of the remaining land area is developed for residential uses (Martha's Vineyard Commission 2010).

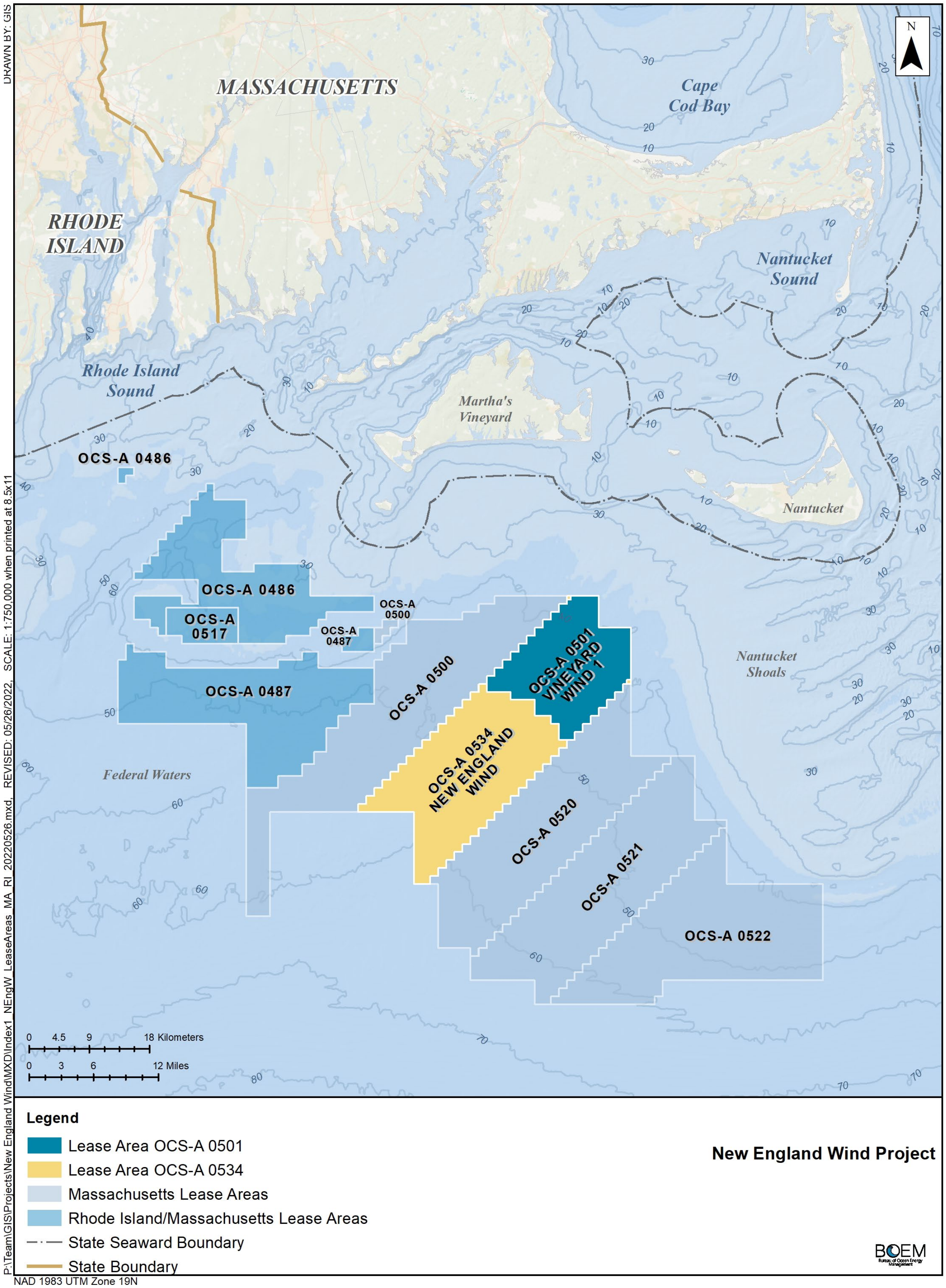



**Figure B.1-1: Proposed Project Region**

From the Cape Cod coast, the proposed Project would extend south/southwest through Nantucket Sound, pass between Martha's Vineyard and Nantucket via Muskeget Channel, and continue south offshore. Offshore waters in the proposed Project area would be located within the greater Georges Bank area (though not part of the bank itself) of the Northeast U.S. Continental Shelf Ecosystem. This ecosystem extends from the Gulf of Maine to Cape Hatteras, North Carolina (BOEM 2014). The Southern Wind Development Area (SWDA) and offshore export cable corridor (OECC) would be located within the southern New England subregion of the Northeast U.S. Continental Shelf Ecosystem, which is distinct from other regions based on differences in productivity, species assemblages and structure, and habitat features (Cook and Auster 2007).

### B.1.2 Climate and Meteorology

Understanding atmospheric physical processes are vital to offshore wind energy development. National Oceanic and Atmospheric Administration (NOAA) buoys collect site-specific information on air and water temperature, wind speeds and direction, and air pressure via the National Data Buoy Center. Current and historical data is available to the public. NOAA satellites collect a wide variety of atmospheric data over much larger regions. Several lessees are already collecting site-specific data within their lease area(s) using specialized buoy systems to inform their project engineering designs. This data may also provide a baseline for comparison in the future.

The Atlantic seaboard is classified as a mid-latitude climate zone based on the Köppen Climate Classification System. The region is characterized by mostly moist subtropical conditions, generally warm and humid in the summer with mild winters. During the winter, the main weather feature is the nor'easter in the northeastern United States. During the summer, convective thunderstorms occur frequently. The Atlantic hurricane season runs from June 1 to November 30.

The Massachusetts climate is characterized by frequent and rapid changes in weather, large daily and annual temperature ranges, large variations from year-to-year, and geographic diversity. The National Climatic Data Center (NCDC) defines distinct climatological divisions to represent areas that are nearly climatically homogeneous. Locations within the same climatic division are considered to share the same overall climatic features and influences. The site of the proposed Project is located within the Massachusetts coastal division.

#### B.1.2.1 Ambient Temperature

According to NCDC data for the Massachusetts coastal division, the average annual temperature is 50.5 degrees Fahrenheit (°F), the average winter (December through February) temperature is 31.7°F and the average summer (June through August) temperature is 69.6°F, based on data collected from 1987 through 2019. Table B.1-1 summarizes average temperatures at the individual recording stations within the general area of the proposed Project. Data for some stations are reflective of different years of weather observations; however, the general pattern shows little difference across the listed locations.

**Table B.1-1: Representative Temperature Data**

| Station | Annual Average °F | Annual Maximum °F | Annual Minimum °F |
|---|---|---|---|
| Coastal Division | 50.5 | 59.2 | 41.8 |
| Nantucket | 50.7 | 57.6 | 43.9 |
| Martha's Vineyard | 51.2 | 59.1 | 43.2 |
| Hyannis | 51.1 | 58.8 | 43.4 |
| Buzzards Bay Buoy | 50.4 | NA | NA |
| Nantucket Sound Buoy | 52.4 | NA | NA |

Sources: NOAA 2019a (Coastal Division 2019 data; Nantucket 2019 data; Martha's Vineyard 2019 data; Hyannis 2019 data), 2019b (Buzzards Bay Buoy 2009–2019 data; Nantucket Sound Buoy 2009–2019 data)

°F = degrees Fahrenheit; NA = not applicable

### B.1.2.2 Wind Conditions

Table B.1-2 summarizes wind conditions in the Massachusetts coastal division. Table B.1-2 shows the monthly average wind speeds, monthly average peak wind gusts, and the hourly peak wind gusts for each individual month. Data from 2009 through 2019 show that monthly wind speeds range from a low of 11.97 miles per hour in July to a high of 17.02 miles per hour in January. The monthly wind peak gusts reach a maximum during November at 21.23 miles per hour. The 1-hour average wind gusts reach a maximum during October at 64.65 miles per hour.

**Table B.1-2: Representative Wind Speed Data**

| Month | Monthly Average Windspeed (miles per hour) | Monthly Average Peak Gust (miles per hour) | Peak 1-Hour Average Gust (miles per hour) |
|---|---|---|---|
| January | 17.02 | 20.97 | 61.29 |
| February | 15.77 | 19.35 | 63.53 |
| March | 15.91 | 19.44 | 64.42 |
| April | 14.90 | 18.12 | 49.21 |
| May | 13.14 | 15.89 | 58.16 |
| June | 12.31 | 14.93 | 44.52 |
| July | 11.97 | 14.49 | 57.04 |
| August | 12.48 | 15.14 | 59.95 |
| September | 13.92 | 17.08 | 51.90 |
| October | 16.45 | 20.40 | 64.65 |
| November | 17.01 | 21.23 | 57.71 |
| December | 15.99 | 19.84 | 59.50 |

Source: NOAA 2019b (National Data Buoy Center, Nantucket Sound Station 44020, 2009–2019)

Throughout the year, wind direction is variable. However, seasonal wind directions are primarily focused from the west/northwest during the winter months (December through February) and from the south/southwest during the summer months (June through August). Figure B.1-2 shows a 5-year wind rose for Buoy Station 44020 (Nantucket Sound). Wind speeds are in meters per second. Percentages indicate how frequently the wind blows from that direction.

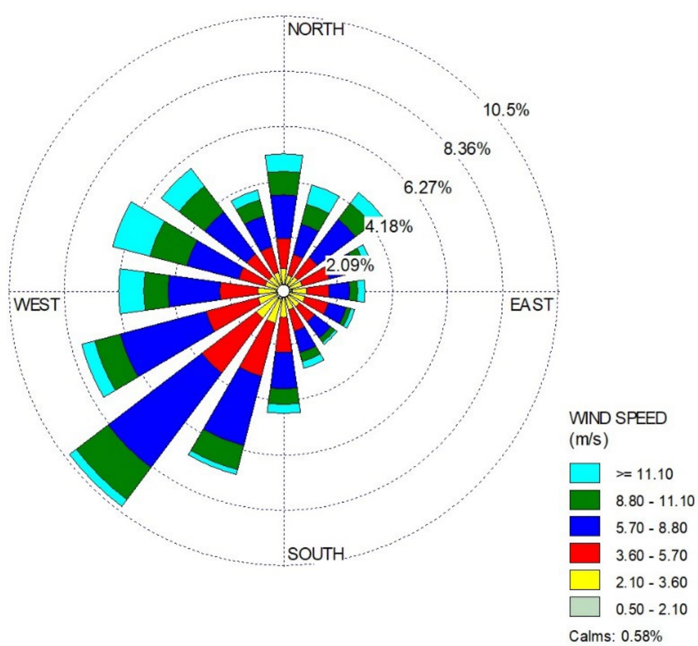



**Figure B.1-2: 5-Year (2015–2019) Wind Rose for Buoy 44020**

### B.1.2.3 Precipitation and Fog

Data from NCDC show that the annual average precipitation is 49.75 inches in the Massachusetts coastal division. Table B.1-3 shows monthly variations in average precipitation, which range from a high of 5.59 inches for October to a low of 3.30 inches in May.

**Table B.1-3: Representative Monthly Precipitation Data (2009–2019)[a]**

| Month | Average Precipitation (Inches) |
|---|---|
| January | 4.04 |
| February | 3.86 |
| March | 4.67 |
| April | 4.14 |
| May | 3.30 |
| June | 4.20 |
| July | 3.72 |
| August | 3.67 |
| September | 3.56 |
| October | 5.59 |
| November | 4.15 |
| December | 4.87 |
| Annual Average | 49.75 |

Source: NOAA 2019a

[a] Precipitation is recorded in melted inches (snow and ice are melted to determine monthly equivalent). Data are representative of the Massachusetts coastal division.

Snowfall amounts can vary quite drastically within small distances. Data from the Martha's Vineyard Station shows that the annual snowfall average is approximately 23 inches, and the month with the highest snowfall is February, averaging around 8 inches.

Fog is a common occurrence along coastal Massachusetts. Fog is especially dense across the water south of Cape Cod toward the islands of Martha's Vineyard and Nantucket. Fog data were collected from 1997 to 2009 at the BUZM3 meteorological station in Buzzard's Bay, approximately 25 miles from the proposed Project site; and from 2007 to 2009 at the Martha's Vineyard Coastal Observatory meteorological station 2 miles south of Martha's Vineyard (Merrill 2010). The data show that fog is most common in the proposed Project area during the months of June, July, and August, with a typical range of 6 to 11 days per month with at least 1 hour of fog. In the winter, fog is much less frequent, with 3 or fewer days with at least 1 hour of fog.

The potential for icing conditions (i.e., atmospheric conditions that can lead to the deposition of ice from the atmosphere onto a structure) was also predicted based on data collected at the BUZM3 tower (Merrill 2010). Icing is rare when the water temperature is greater than 43°F, so in most months of the year and for many days during the winter months, there is no potential for icing to occur. The data show that moderate icing (defined by the Federal Aviation Administration as a rate of accumulation such that short encounters become potentially hazardous) is unlikely to occur more than 1 day per month, while the potential for light icing is above 5 days per month in December, January, and February. Icing would be unlikely to occur any time from April through October.

### B.1.2.4 Hurricanes

During the 160 years for which weather records have been kept, ten hurricanes have made landfall in Massachusetts and five others have passed through the SWDA without making landfall. The latest hurricane that made a direct landfall was Hurricane Bob in 1991. Of those ten hurricanes, five ranked as Category 1 on the Saffir-Sampson Scale, two were Category 2 hurricanes, and three were Category 3 hurricanes. Since records have been kept, no Category 4 or 5 hurricanes have made landfall in

Massachusetts. Of the hurricanes that passed through the SWDA without making landfall in Massachusetts, one was Category 2, one was Category 1, and three were tropical storms when they passed through the SWDA. The most recent of these storms was Beryl in 2006. NOAA 2019c defines the winds speeds and typical damage associated with each category of hurricane.

In addition to hurricanes, Nor'easters (cold-core extratropical cyclones) may occur several times per year in the fall and winter months. Wind gusts during the strongest Nor'easters can cause similar damage to a Category 1 hurricane, although Nor'easters typically are larger and last longer than hurricanes.

### B.1.2.5 Mixing Height

Table B.1-4 presents atmospheric mixing height data from two nearby stations. As shown Table B.1-4, the minimum average mixing height is 1,276 feet, while the maximum average mixing height is 4,662 feet. The minimum average mixing height is much higher than the height of the top of the proposed rotors (1,171 feet).

**Table B.1-4: Representative Seasonal Mixing Height Data**

| Season[a] | Data Hours Included[b] | Nantucket Average Mixing Height (feet)[c] | Chatham Average Mixing Height (feet)[c] |
|---|---|---|---|
| Winter | Morning – no precipitation hours | 2,559 | 2,192 |
| | Morning – all hours | 2,969 | 2,149 |
| | Afternoon – no precipitation hours | 2,595 | 2,539 |
| | Afternoon – all hours | 2,920 | 2,451 |
| Spring | Morning – no precipitation hours | 1,929 | 2,234 |
| | Morning – all hours | 2,408 | 2,178 |
| | Afternoon – no precipitation hours | 2,448 | 3,996 |
| | Afternoon – all hours | 2,713 | 3,642 |
| Summer | Morning – no precipitation hours | 1,276 | 1,867 |
| | Morning – all hours | 1,470 | 1,864 |
| | Afternoon – no precipitation hours | 1,998 | 4,662 |
| | Afternoon – all hours | 2,188 | 4,249 |
| Fall | Morning – no precipitation hours | 2,051 | 1,857 |
| | Morning – all hours | 2,425 | 1,913 |
| | Afternoon – no precipitation hours | 2,510 | 3,399 |
| | Afternoon – all hours | 2,726 | 3,100 |
| Annual Average | Morning – no precipitation hours | 1,952 | 2,034 |
| | Morning – all hours | 2,320 | 2,028 |
| | Afternoon – no precipitation hours | 2,385 | 3,678 |
| | Afternoon – all hours | 2,638 | 3,373 |

Source: MMS 2009

[a] Winter = December, January, February; Spring = March, April, May; Summer = June, July, August; Fall = September, October, November
[b] Missing values not included
[c] Data from MMS 2009

### B.1.2.6 Potential General Impacts of Offshore Wind Facilities

A known impact on the atmospheric environment as a result of offshore wind facilities is the wake effect. The presence of a wind facility extracts energy from the free flow of wind, creating a "wake" downstream of the facility. The resulting "wake effect" is the aggregated influence of the wake on the available wind resource and the energy production potential of any facility located downstream. Christiansen and Hasager (2005) observed offshore wake effects from existing facilities via satellite with synthetic aperture radar to last anywhere from 1.2 to 12.4 miles depending on ambient wind speed, direction, degree of atmospheric stability and the number of turbines within a facility. During stable atmospheric conditions, these offshore wakes can be longer than 43.5 miles.

A less understood impact is the formation of a microclimate. Past modeling studies suggest a change in temperature and moisture downwind of offshore wind energy facilities. From September 2016 to October 2017, a study using aircraft observations accompanied with mesoscale simulations provided a look into the spatial dimensions of micrometeorological impacts from a wind energy facility in the North Sea (Siedersleben et al. 2018). Large offshore wind facilities can potentially have an impact on the local microclimate. However, this potential is fairly low because very specific conditions must be met for the impact to occur. The local redistribution of moisture and heat due to rotor-induced vertical mixing has no influence on the local climate outside of the immediate vicinity of a wind facility. Only a permanent change in the air-sea interactions could change the local climate. For example, warmer air over a cold ocean would result in an increased heat transfer to the ocean, thereby causing more water vapor transport into the atmosphere because of the dryer air within the wake of a turbine/facility. Such events are rare because they can only occur when there is a strong increase in temperature with altitude at or below hub height to create the warming and drying within the wake of large offshore wind energy facilities. The increase of temperature with height is an inversion, better explained as a reversal of the normal decrease of air temperature with altitude. These specific conditions are not likely to occur off the south coast of Massachusetts.

### B.1.3 Geology and Seafloor Conditions

#### B.1.3.1 Historical Formation

The continental shelf off the U.S. Eastern Seaboard and New England today resides on a passive continental margin with minimal tectonic and seismic activity. Prior to this relatively quiescent period, numerous orogenies (continental plate collisions) hundreds of millions of years ago produced the multiple mountain chains that are prominent on the present landscape, including those of the Appalachian (Blue Ridge, Allegheny, Catskill, Berkshire, Green, and White Mountains) and Adirondack systems. Weathering and erosion from various geologic processes have supplied sediment from the bedrock-based mountains and piedmont to the coastal plain regions sloping down toward the Atlantic Ocean. The sediment forms a wedge that thickens toward the sea and is modified by fluvial, estuarine, and coastal processes, as well as sea level rise at lands' edge. In more recent times, a series of glaciations during the Quaternary period (starting approximately 2.6 million years ago) has greatly modified the landscape in the northern latitudes of the United States, scouring, transporting, and depositing materials along the glaciers' paths, with results of the latest Wisconsin glacial stage (110,000 to 11,700 years ago) being the most evident.

Prior to Quaternary glaciation in southern New England, an extensive coastal plain consisting of Tertiary (now Neogene and Paleogene) and Cretaceous rocks and semi-lithified sediments extended seaward from Cape Cod to at least the location of present-day Martha's Vineyard and Nantucket Island, if not farther south. Sea level then varied with glacial and inter-glacial periods from well below to significantly above present-day elevation. During glacial episodes, a mature fluvial drainage system dissected the coastal plain, eroding and transporting sediment southward, while marine sediments accumulated during inter-glacial periods.

#### B.1.3.2 Current Seafloor Conditions

A wide range of current seabed conditions persist that are a direct result of these historical geologic events. Past geologic processes shaped the stratigraphic foundation of the continental shelf, the upper layers of which have been subsequently reworked during sea level rise by currents, waves, and storms. A limited supply of terrigenous sediment exists in the region, so the surficial sediment layer is primarily sourced from older underlying glacial deposits. A direct correlation between grain size and bottom current velocities is evident moving in the onshore-to-offshore direction, from the strong tidal components in and around Nantucket Sound to the open water, general shelf circulation south of the islands. Where very high current velocities exist in the Nantucket Sound region, abundant bedforms rework the sandy surficial layer, and in highly erosive areas only the coarsest material (gravel, cobbles, boulders) persists (Baldwin et al. 2016; Poppe et al. 2012). Sediment types and bedforms in the SWDA are indicative of post-glacial material mixed with upper continental shelf deposits. These deposits consist primarily of medium- to fine-grained material (sand, silt, clay) that has been winnowed from glacial drift by marine and fluvial processes (Baldwin et al. 2016).

Marine scientific data acquired from five seasons of offshore survey programs have been analyzed to provide information on existing site conditions in the SWDA. Table B.1-5 and B.1-6 provide data and results related to geological resources in the SWDA and OECC, respectively.

**Table B.1-5: Geological Survey Data and Results in the Southern Wind Development Area**

| Data/Results | Summary |
|---|---|
| Data | • > 12,328 miles of geophysical trackline data<br>• 8 deep boreholes<br>• 56 deep downhole CPTs<br>• 210 seabed CPTs<br>• 187 vibracores<br>• 96 benthic grab samples with still photos<br>• 36 underwater video transects |
| Surface conditions | • Water depths 141 to 203 feet, offshore slope of < 1 degree toward the south-to-southwest<br>• Minimal seafloor topography, minimal relief<br>• Generally homogenous surficial sediments, varying percentages of sand and silt<br>• Irregular, northeast-to-southwest bathymetric lows up to 16.4 feet deep<br>• Rippled scour depressions 0.7 to 3.3 feet deep with lateral extents ranging from tens to hundreds of feet; contain ripple bedforms < 1.0 foot high and wavelengths 1.6 to 9.8 feet; slopes at edges of ripple scour depressions up to 6 degrees<br>• Benthic habitats of uniform, unconsolidated sediment<br>• Trawler drag marks on the seafloor indicate some fishing<br>• Very few human-made objects (mostly fishing gear and debris); two possible shipwrecks identified in the SWDA |
| Subsurface conditions | • Consistent stratigraphy underlying the site<br>• Materials range from clay to gravel, with isolated coarse material<br>• Discontinuous coarse deposits associated with lag deposits with possible isolated boulders<br>• Abundant channeling apparent throughout, few other structures<br>• Ravinement surface 3.3 to 19.7 feet below the seafloor<br>• Magnetic variability in localized areas associated with strong sub bottom reflectors in the upper 6.6 to 23.0 feet, likely associated with natural ferrous-rich deposits |
| Hazards | • Paleochannels throughout the SWDA, often with gravels at the base of the channel and clays to sands on the channel margins<br>• Peat/organic material in paleochannels scattered throughout SWDA<br>• Boulders possible in subsurface throughout the SWDA, patchy and scattered, approximately 33 to 302 feet below the seabed<br>• Weakly cemented beds are possible throughout the SWDA at depths below 105 feet below the seabed<br>• Two possible wreck sites identified in the western portion of the SWDA |

Source: COP Volume II-A, Table 6.0-1; Epsilon 2022

CPT = cone penetrometer testing; SWDA = Southern Wind Development Area

**Table B.1-6: Geological Survey Data and Results in the Offshore Export Cable Corridor**

| Data/Results | Summary |
|---|---|
| Data | • > 3,921 miles of geophysical trackline data over a 2,182- to 5,479-foot-wide corridor<br>• 2 deep bore holes<br>• 3 deep downhole CPTs<br>• 134 seabed CPTs<br>• 192 vibracores<br>• 163 benthic grab samples with still photos<br>• 119 underwater video transects |
| Surface conditions | • Water depths < 3.6 to 150.9 feet; local slopes up to 25 to 30° on bedforms<br>• Numerous natural slopes/topography, < 10-degree gradients<br>• Overall homogenous surficial sediments, mainly sand<br>• Mobile surface layer with sand waves > 6.6 feet high locally<br>• Sand with some gravel, cobbles in shallow, higher current areas<br>• Localized concentrations of boulders with gravel and sand in the northern portion of the OECC<br>• Sand with silt in deeper water areas, less tidal current<br>• Soft surficial layer (biogenic sediments) offshore in deeper water, immediately seaward of the offshore slope south of Muskeget in depths of 82 to 98 feet<br>• Variable benthic habitats due to different substrates; some sensitive habitats possible locally<br>• Rippled scour depressions offshore, bedform fields with isolated, larger sand waves over 16.4 feet in Nantucket Sound<br>• Coarse deposits with boulders in Muskeget Channel area<br>• Overall low concentration of manmade objects with moderate concentration locally<br>• Sediments relatively consistent, sand with coarse material particularly in higher current areas and silt in deeper and quiescent locations |
| Subsurface conditions | • Abundant buried channels north of Horseshoe Shoal; no unusual sediments of concern identified<br>• Fine-grained, organic-rich layers associated with channel bank/terrace deposits adjacent to some paleochannels<br>• Often acoustically transparent mobile sand layer<br>• Coarse deposits with boulders in Muskeget Channel area |
| Hazards | • Large sand waves in some areas<br>• Paleochannels with top sections in the upper 6.6 feet; all sediments sampled by geotechnical investigations and pose no threat to cable installation<br>• Localized subsurface gas in Centerville Harbor; no issue for cable installation<br>• Coarse deposits with boulders in Muskeget Channel area<br>• Possible sensitive habitats for avoidance, if possible, mainly Muskeget area<br>• Isolated manmade objects in the corridor, one debris pile/possible shipwreck in the OECC, approximately 6.8 miles southwest of Craigville Beach; one unidentified buried possible cable is located southeast of Martha's Vineyard |

Source: COP Volume II-A, Table 6.0-2; Epsilon 2022

CPT = cone penetrometer testing; OECC = offshore export cable corridor

Marine geological resources in this region are very stable on the scale of a human lifetime, except for surficial sediments, which can be dynamic. Surficial sediments, especially clays/muds, silts, and sands are subject to movement by currents driven by tides, storms, and broad-scale circulation patterns. While most of the OECC is very stable, the seafloor running from just south of Martha's Vineyard and Nantucket to north of Horseshoe Shoal in Nantucket Sound is a dynamic environment characterized by highly mobile bedforms, deep (greater than approximately 131 feet) tidal channels, and patches of exposed coarse material (i.e., boulders, cobbles, and gravels derived from glacial till). Volume II-A, Section 2.0 of the Construction and Operations Plan (COP) presents conditions relevant to geological resources (Epsilon 2022). Human activities have the potential to alter sediment structure, slope, and particle size distribution patterns; coastline morphology; exposed or buried channel morphology; patterns of erosion, sediment transport, and deposition; sediment chemical characteristics; weathering processes; surface movements (e.g., landslides); and the shape, structure, and strength of bedrock, as well as physically extract geological resources through mining.

Very homogenous seafloor conditions exist in offshore areas, dominated by fine sand and silt. Water depths range from 114.8 to 170.6 feet over a gently sloping seafloor that dips toward the south/southwest. There is a distribution of localized patches of ripples and sand waves throughout the area. These features represent the only vertical relief in an otherwise relatively flat, featureless seafloor that slopes gradually offshore. These features range from 32 to 656 feet wide by 328 to 1,640 feet long but may exceed 3,280 feet in length. These features are typically less than 3.3 feet in height but can reach up to 22.9 feet.

Seafloor features that are stable and exhibit vertical relief provide a significant rare habitat amidst the broad sand flats. Such habitats include gravel or pebble-cobble beds, sand waves, biogenic structures (e.g., burrows, depressions, sessile soft-bodied invertebrates), shell aggregates, boulders, hard-bottom patches, boring sponge (*Cliona celata*) beds, and cobble beds with and without sponge cover. These coarser substrates provide complex interstitial spaces for shelter and generally exhibit greater faunal diversity. Other special, sensitive, and unique habitats (living bottom, hard/complex bottom, eelgrass beds, and marine mammal habitats) occur in places in and near the proposed Project (COP Volume II-A, Section 5.2; Epsilon 2022).

The seafloor near Muskeget Channel is particularly complex, being composed mostly of sand, but with a variety of slopes, contours, and sand wave dimensions (COP Volume II-A, Section 2.1; Epsilon 2022). This area also includes a significant amount of hard/complex bottom habitat, as well as boulders that are buried shallowly and could be exposed by shifting sands. Water depths in the Muskeget Channel area range from 0 to 100 feet, with the main part of the channel lying mostly between 23 and 65 feet. The seafloor in the proposed OECC is primarily a flat bed of sand and silt, but it includes sparse small patches of minor vertical relief, as well as several eelgrass beds nearby. Water depths in the proposed OECC, which the applicant has routed to avoid shoals and eelgrass beds, are around 40 to 50 feet for most of the route, becoming gradually shallower over the final 2 miles approaching land.

Seafloor habitats can also be classified more broadly as biogenic structures, hard bottom, complex seafloor, and other, which would include the majority of flat sand and mud habitat in the SWDA and OECC (Epsilon 2018). Hard bottom in the OECC typically consists of a combination of coarse deposits such as gravel, cobble, and boulders in a sand matrix. These coarse deposits form a stable surface over which sand waves forced by tidal currents periodically migrate. Certain hard-bottom areas also include piles of exposed boulders, but no bedrock outcrops are present in the OECC or SWDA. Complex seafloor in the OECC and SWDA consists of bedforms such as rugged fields of sand waves; although these mobile features are less amenable to benthic macroinvertebrates, they may be attractive to finfish. Figures 3.5-2 through 3.5-6 in Section 3.5, Coastal Habitats and Fauna, delineate these seafloor areas.

The proposed Project would be located south of Cape Cod in the Atlantic Ocean and Nantucket Sound, where the physiographic regions known as the Seaboard Lowland section of the New England Province and the Atlantic Coastal Plain Province meet. The proposed Project would straddle these two physiographic regions. The Lowland, which includes part of the continental shelf, is a broad belt that extends from south of Rhode Island northeast to central Maine. Erosion and deposition related to glacial processes produced numerous changes in drainage patterns and observed topography over geologic time. The land formations in the Coastal Plain are low relief and are composed of a wedge of unconsolidated sediments that overlay much older consolidated rock. The north bounds of the Coastal Plain run from the north side of Long Island through Rhode Island Sound to Martha’s Vineyard. Offshore water depths generally range from approximately 131 to 262 feet, with some areas as shallow as 65 feet. North of Martha’s Vineyard, Nantucket Sound exhibits water depths mostly around 40 to 50 feet, with several shallower shoals, and it generally becomes shallower as one approaches Cape Cod. The sea has also influenced landforms in this region, creating barrier spits and longshore accretions of sandy beaches with the prevailing currents (Fenneman 1938; Denny 1982; Oldale 1992).

Geology and seafloor conditions are a fundamental factor determining whether a potential site could support wind turbine foundations. The major possible factors relating to a seafloor failing to support a pile-driven wind turbine generator (WTG) or other marine structure are liquefaction due to earthquakes or wave action, seafloor suitable for foundation type (monopile), soil cohesion and soil strength, repeat loading (structural), inadequate damping (structural), sediment transport and sand waves, and scour.

Liquefaction is a process in which solid material behaves as a liquid. Earthquakes can produce vibrations that interact with soil particles in such a way that they become suspended while agitated by that energy. While the soil particles are suspended, they behave like a liquid, allowing structures attached or imbedded into the seafloor to sink or tip over. The frequency at which this phenomenon can occur is related to the frequency and intensity of earthquake activity within an area, the composition and depth of the soil, and the underlying stratigraphy of the area. To a lesser degree, wave action can also create shallow liquefaction effects depending on wave and sediment characteristics.

Foundation types for particular offshore wind projects are selected based on the seafloor's characteristics. Seafloor conditions that may be challenging for one foundation type may be well suited for another. Structures that are pile driven into the seafloor are designed to be sited in locations where there is ample loose sediment to allow for it. For these foundation types, some amount of rocks or boulders intermixed within the sediment can be tolerated through avoidance, micro-routing, or drilling, and the depth a pile is driven can be increased to accommodate for looser sediments. For other types of foundations and engineering strategies, rocky seafloor conditions are preferable.

Soil cohesion is how strongly bound together soil particles are, and soil strength is the amount of shear stress a soil can sustain. The underlying layers, types, and depths of soils of a seafloor affect how much strength and stiffness are exhibited by the soil. The particles that make up soil vary in compactness, size, and abundance. Material with different proportions of particle sizes will have different properties. If a seafloor is composed of material that lacks cohesion and soil strength, it may deform or displace around the structure under the forces of pile installation.

Repeat loading refers to repeated, externally applied forces on a structure. Changes in environmental conditions created by wind and wave forces can vary in direction, intensity, and duration. This repeat loading can have a cumulative impact on a structure's ability to stand and must be accounted for within the design of the structure.

Damping is the suppressing of energy or decrease in swaying or swinging. Inadequate damping is when forces are able to create enough movement that can affect the function or integrity of a structure. Structures sway from receiving energy from dynamic wind and wave forces. These oscillations can become amplified over time if they are not mitigated through damping and can potentially compromise the structure. Damping can be done by increasing the size and depth of the foundation and adding components to the structure that act to mitigate or negate loading by absorbing and counter-acting the oscillation.

Sediment transport is the movement of sediment, typically due to a combination of gravity acting on the sediment and/or movement of the water with sediment particles in it. Sand waves are ridge-like structures that are formed by waves or currents of the water. Typically, sand waves are not static. They are migrating bedforms and evidence of active sediment transport.

Scour is the removal of sediment, such as silt, sand, and gravel, from around the base of obstructions due to a current's flow in the sea. An obstruction in a waterbody that is moving may cause flow changes, including higher or lower velocities around the obstructions. Foundations installed in the seabed are subject to scour around the base of the structure where it contacts the seabed.

To determine whether the seafloor can support WTGs, geologic surveys are performed. Geologic surveys can be broadly divided as either physiographic or geotechnical. Physiographic, also known as geophysical, surveys involve passive or remote techniques that provide information about the surface and near-surface of the seafloor, without physically contacting it. Examples of these physiographic surveying techniques include hydrographic, bathymetric, sonar, and magnetometer surveying. Geotechnical surveys physically sample and penetrate the seafloor. These are the surveys that provide the information most pertinent to the ability of the seafloor to support a given type of foundation design. Two types of geotechnical surveys, boring and vibracore, are techniques that extract material from below the seafloor that can have their composition and characteristics analyzed in a laboratory. Cone penetration tests provide information about the layers of material under the seafloor surface, including bearing capacity and soil strength of the sediment, by measuring the pressure and resistance as the instrument is driven into the seafloor. Benthic grabs directly pick up sediment samples at the surface of the seafloor. All these direct samplings and measurements provide input to computer modeling that engineers use to assess the ability of the seafloor to support WTGs.

When selecting the foundation type and design for a wind energy project, water depth and the underlying material of the seafloor are some of the most important considerations. Structural problems can be avoided by matching foundation design to site characteristics. The most widely used foundation type is a monopile that is driven into the seafloor in locations with sufficiently thick sediment above the bedrock, few boulders, and less than 100 feet water depth.

Foundations and towers are among the least likely WTG components to require repair or replacement. An analysis of several European offshore wind facilities during the first 10 years of operations was conducted, which included hundreds of WTGs between 2 to 4 megawatts in size of varying ages (Carroll et al. 2016). At the time the study was published, approximately 80 percent of all offshore wind foundations in European waters were monopiles (EWEA 2016). Failure rates of component groups in the study were examined as a combination of replacements, minor repairs, and major repairs per turbine each year. The study found that the replacement rate of a single foundation and tower was 0.0, indicating there was no occurrence of a foundation and tower failing to stand during this time frame. Foundations and towers had a combined repair rate of 0.181 per year. Repairs to the foundation and tower are among the quickest and cheapest relative to the other WTG component categories (Carroll et al. 2016). A review of cable failures found an average failure rate for offshore alternating current cables of approximately 0.003 failure per kilometer per year (Warnock et al. 2019).

Physiographic and geotechnical surveys have explored the subsurface geological conditions in the proposed SWDA and OECC (COP Volume II-A, Section 2.1.2.2, Epsilon 2022). BOEM’s Engineering and Technical Review Branch (ETRB) has reviewed all the geophysical and geotechnical information provided in the New England Wind Project COP and other data submissions from Park City Wind, LLC (the applicant). ETRB concurs with the applicant’s conclusion that fixed bottom foundations, as described in the COP, are technically feasible and safe for WTG and electrical service platform (ESP) installations to a depth below the seafloor of up to 279 feet (for pin piles). If the COP is approved and the applicant intends to install foundations beyond these depths, further information from the applicant would be required with the facility design report and fabrication and installation report. This information would then be evaluated by ETRB prior to allowing the installation of components beyond the above stated depths.

If the COP is approved, the applicant must then submit a facility design report and a fabrication and installation report. The facility design report provides specific engineering details of the design of all facilities, including structural drawings, environmental and engineering data, a complete set of calculations used for design, proposed Project-specific geotechnical studies, and a description of loads imposed on the facility. The facility design report must demonstrate that the design conforms to the responsibilities under the lease. The fabrication and installation report describes how the facilities would be fabricated and installed in accordance with the design criteria identified in the facility design report, the COP, and generally accepted industry standards and practices. Both of these reports must be reviewed and certified by a BOEM-approved third-party certified verification agent prior to submittal. BOEM has 60 days to review these reports and provide objections to the applicant. If BOEM has no objections to the reports, or once any BOEM objections have been resolved, the applicant may commence construction of the proposed Project.

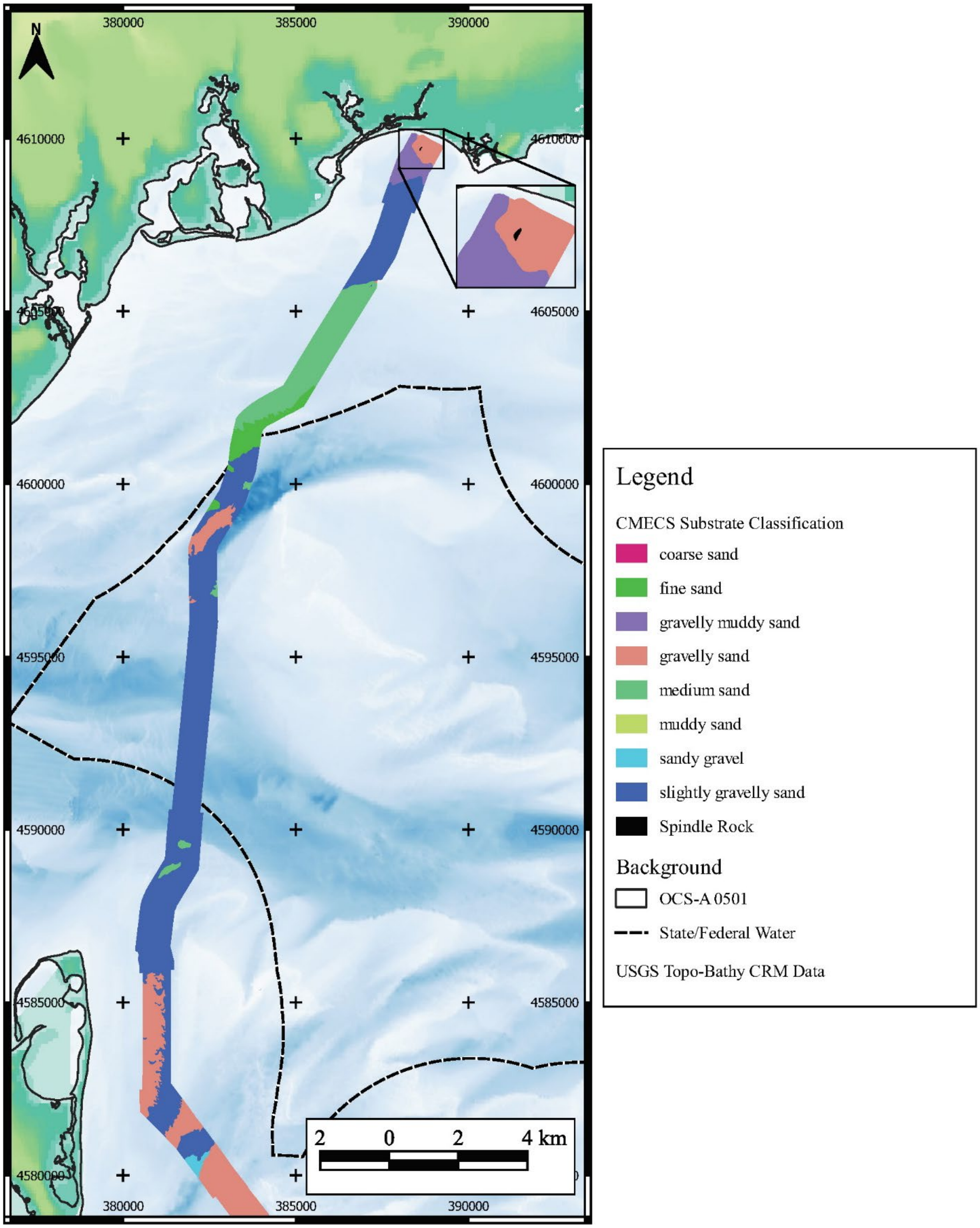
Seafloor conditions can also be described according to the Coastal and Marine Ecological Classification Standard substrate component, which classifies seafloor types based on the composition and particle size of the surface layers of the substrate (FGDC 2012). Maps delineating seafloor conditions according to Coastal and Marine Ecological Classification Standard substrate classifications, based on the results of a 2018 survey reported in Attachment E of Epsilon 2018 (as cited in Vineyard Wind 2020), are shown on Figures B.1-3 and B.1-4.

### B.1.3.3 Potential General Impacts of Offshore Wind Facilities

Scour, turbidity, and sedimentation are all conditions related to the strength of oceanographic forces, geologic conditions, and sediment processes. Scour occurs when the oceanographic forces are strong enough to mobilize the local sediments away from their current location, without additional sediments being added to the system to replace the mobilized sediments. Turbidity occurs when either sufficient force is present to mobilize sediments from the seabed into the water column, or additional sediments are being put into the system in such a way that they remain suspended for a period of time. Turbid conditions would remain as long as the particles are suspended in the water column. Lastly, sedimentation occurs when the oceanographic conditions are not strong enough to mobilize sediments, and additional sediments are actively being deposited.

Geologic conditions heavily influence the feasibility and technical complexity of installing and operating offshore wind facilities. Geologic conditions such as sediment uniformity, density, and grain size can contribute to the potential for an installation or facility to have occurrences of scour, turbidity, and/or sedimentation. The presence of bedforms, such as ripples and sand waves, indicate local oceanographic forces are mobilizing surficial sediments, and a lack of fine sediment indicates current and tidal forcing can be strong enough to remove smaller sized particles.

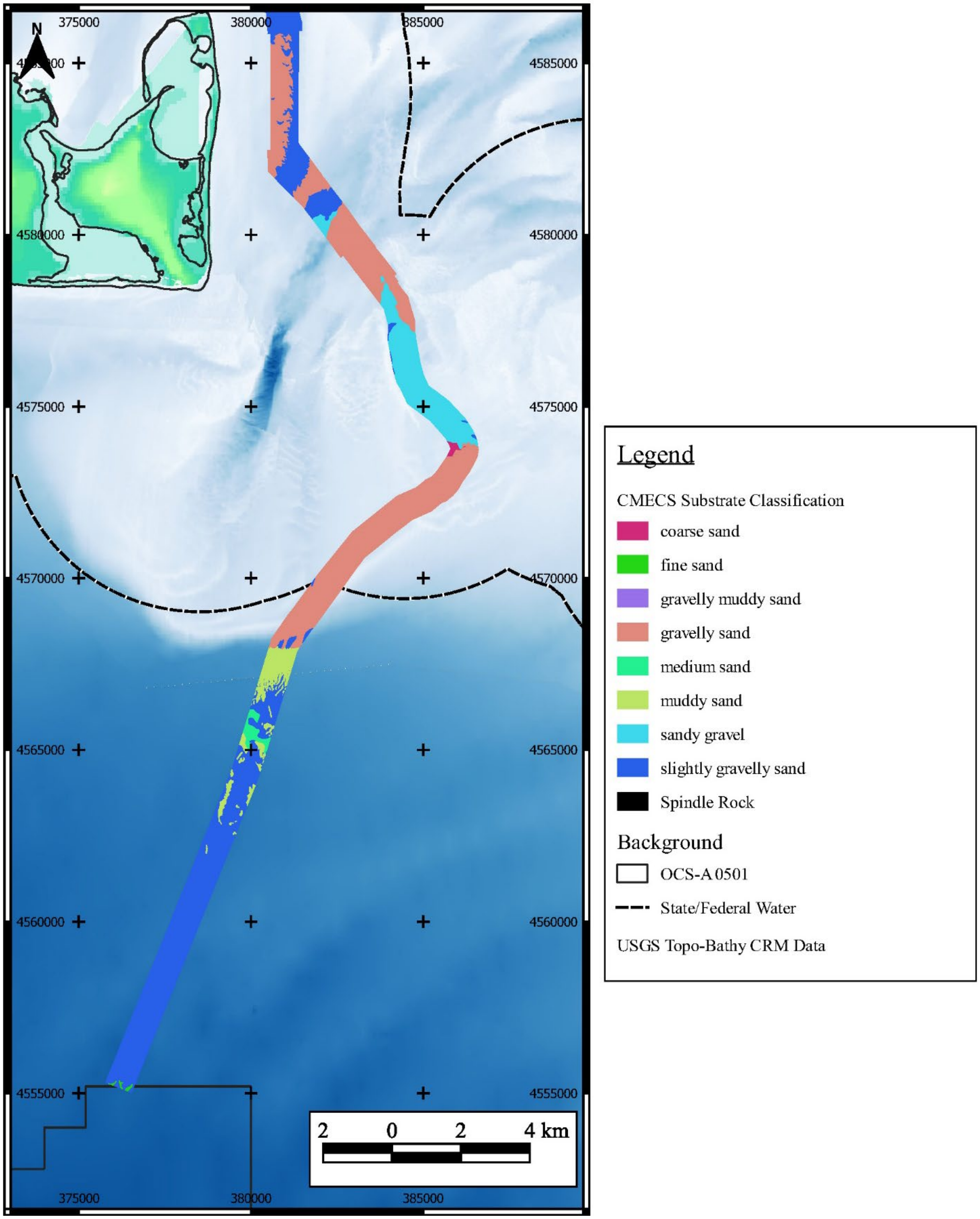
BOEM Atlantic lease areas are described as sediment-starved due to continental geology and the distance from shore, meaning there are no additional sediment inputs to the OCS. Thus, surficial sediments are continually reworked by oceanographic forces such as tides, currents, and storms, and sedimentation is not expected at lease areas. As documented at the Thanet and London Array offshore wind facilities in the United Kingdom, the potential exists for the formation of surficial sediment plumes at WTG monopiles (Vanhellemont and Ruddick 2014). Sediment plumes tend to form when the following conditions are present: shallow water, significant speed of tidal currents, and mobile sediments. The Thanet and London Array offshore wind facilities, which are both located in the Thames River Estuary, are composed of 100 and 175 WTGs, respectively, located in 0 to 82 feet water depths with tidal velocities that vary up to 0.8 to greater than 1 meter per second (Vanhellemont and Ruddick 2014; COP Appendix III-Q, Section 2.1; Epsilon 2022). In contrast, the proposed Project WTGs would be sited in water depths from 141 to 203 feet with tidal velocities less than 0.1 meter per second (0.2 knot) (COP Appendix III-Q, Section 2.1; Epsilon 2022). Sediment transport and mobility is low within the proposed SWDA given the slow tidal current velocity (COP Appendix III-Q, Section 2.1; Epsilon 2022). The lack of conditions required for the formation of sediment plumes are expected to greatly reduce, if not eliminate, the potential for surficial sediment plumes to form. Additionally, the proposed use of scour protection around each of the WTG monopile foundations would be expected to further reduce the already low likelihood of sediment plume formation (Swanson 2019).




Source: Modified from Vineyard Wind 2020

USGS = U.S. Geological Survey

**Figure B.1-3: Coastal and Marine Ecological Classification Standard Substrates within the Vineyard Wind 1 Offshore Export Cable Corridor**




Source: Modified from Vineyard Wind 2020

USGS = U.S. Geological Survey

**Figure B.1-4: Coastal and Marine Ecological Classification Standard Substrates within the Vineyard Wind 1 Offshore Export Cable Corridor**

Turbidity is most closely associated with activities such as cable installation and pile driving, which occur primarily during installation where seabed sediments are actively being disturbed. The sediments are temporarily suspended and then resettle within a short time period of minutes to hours depending on site-specific conditions such as sediment grain size.

Scour is a highly complex response to a multidimensional set of local conditions that include oceanographic forces, sediment properties, and anthropogenic inputs. Current understanding includes strong associations between scour, structure diameter, water depth, and sediment conditions. In general, the larger the diameter of the structure, the shallower the water depths, the more uniform and sandier the sediment conditions; the stronger the oceanographic forces, the more likely an area is to experience scour (Harris and Whitehouse 2014). Scour in uniform sandy soils is expected to increase over time until reaching an equilibrium, while the scour in non-uniform soils is more variable (Harris and Whitehouse 2014).

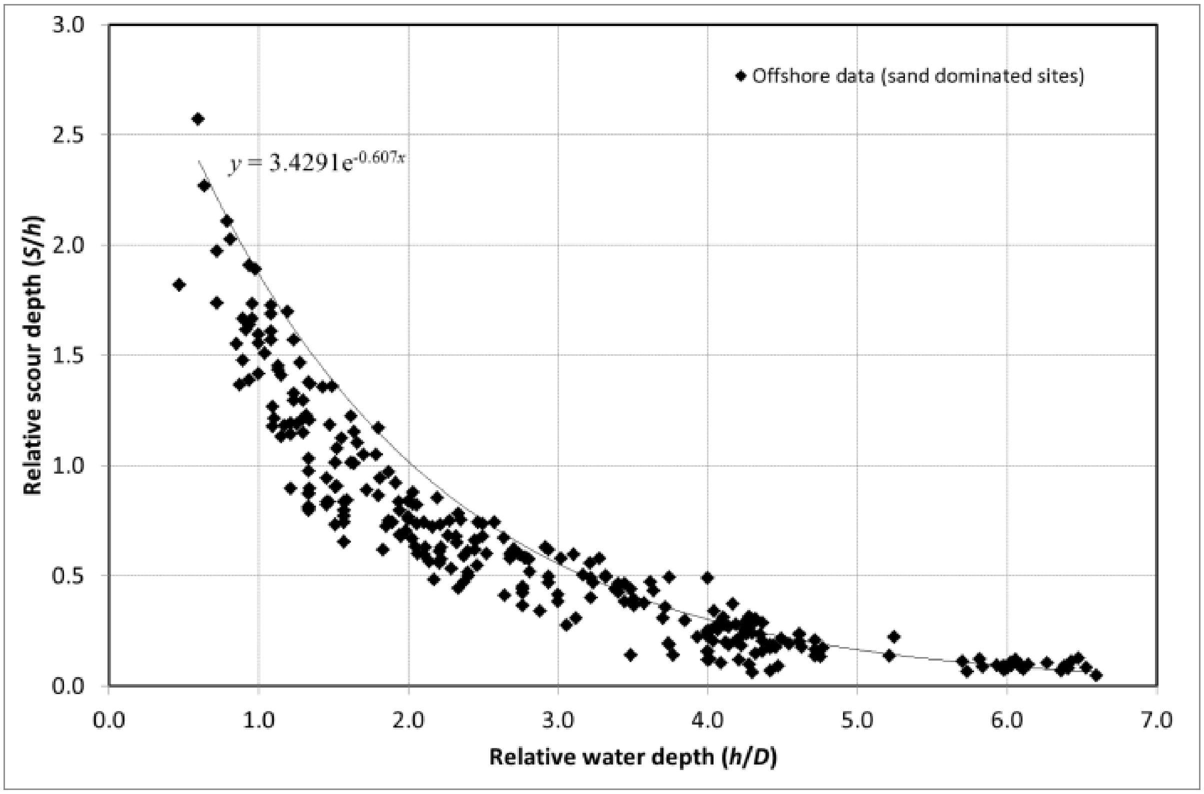
Site conditions and foundation diameter tend to dominate scour potential analysis. Sand-dominated seabeds are more susceptible to severe scour than finer grained or mixed sediments; as the foundation diameters increase, the potential depth (severity) of scour also increases. Based on field measurements at offshore wind energy facilities installed in uniform sand conditions, the relationship between scour and foundation diameter is described as scour (S)/diameter (D) = 1.8 (Harris and Whitehouse 2014). Non-uniform marine soils—a combination of gravel, sand, silt and clay—respond differently than uniform sandy soils, and scour predictions are more complex. Offshore wind energy facilities with non-uniform soils typically experience scour more slowly.

Scour became a significant issue in early offshore wind development during the 2000s as turbine sizes began to increase and facilities were often located close to shore in shallow waters. The most commonly referenced examples of offshore wind energy facility scour often include observations from North Sea sites Scroby Sands and Arklow Bank (Whitehouse et al. 2011). These two sites were located in water depths ranging from about 6.56 to 39.37 feet with pile diameters of 13.78 and 17.06 feet, respectively. As described above, sandy dominated seabeds, such as those found at Scroby Sands and Arklow Bank, are more susceptible to severe scour than finer grained or mixed sediments. In addition, subsequent research has shown the ratio of the water depth to foundation diameter can be a significant indicator for severe scour and was a major contributing factor to the scour experienced as the Scroby Sands and Arklow Bank offshore wind energy facility sites (Figure B.1-5). Other case studies on scour at offshore wind energy facilities include field data from three offshore wind energy facilities located in non-uniform marine soils.

The Barrow Offshore Wind Farm scour survey undertaken in a glacial till area showed modest local scour (S/D = 0.04) (Harris and Whitehouse 2014). Values of S/D = 0.4 were found at the Kentish Flats Offshore Wind Farm, located on a coarse sandy seabed with shell gravel and clay outcrops overlying soft to firm clay deposits. North Hoyle Offshore Wind Farm, located in a strongly heterogeneous region with poorly sorted sediments and a sandy gravel or gravelly sand seabed where larger patches of gravel are found offshore, showed limited scour just after installation; however, within a year, no scour was recorded at any foundation. In general, current industry research indicates scour predictions have vastly improved since large scour pits were identified as a significant issue for offshore wind development, and scour protection has been shown to be effective (Harris et al. 2011).

### B.1.4 Physical Oceanography

Oceanographic forces such as waves, currents, and tides vary along the Atlantic OCS, depending on bathymetry, winds, and other factors. The Atlantic OCS is generally wide and shallow, with water depths reaching 492 feet. Although there is some data available, BOEM recognizes that in-situ oceanographic data is limited along the Atlantic Coast of the United States. To fill these data gaps, extensive worldwide effort has been invested in developing and refining ocean models capable of providing detailed oceanographic information not only along the U.S. coast but on a global scale. Several ocean models run in real-time on a continual basis, receiving data from buoys, gliders, ships, and satellites, updating results accordingly. These models provide daily and long-term oceanographic data sets that span decades, grounded by in-situ measurements.




Source: Harris and Whitehouse 2014

S/h = scour depth divided by water depth; h/D = water depth divided by pile diameter

**Figure B.1-5: Measured Data from European Wind Energy Facilities Showing a Decrease in Relative Scour Depth with an Increase in Relative Water Depth**

Offshore wind developers also contribute to the oceanographic knowledge base through the deployment of data collection buoys during their site assessment phase. Buoys collect data for 1 to 5 years, measuring meteorological and oceanographic (metocean) conditions such as winds, waves, currents, and temperature. Knowing the site-specific metocean conditions is key to facility design and safe navigation and, therefore, a necessity for developers to collect. Some developers have proposed to continue data collection throughout the construction and operations stages.

Key physical factors nearshore include the daily modification of the seabed by tidal currents and episodic extreme storm events that are capable of extensive erosion and redistribution of coastal materials. Offshore, an area immediately west of the proposed Project has been extensively studied, the Rhode Island Ocean Special Area, and the results are informative for the offshore portions of the proposed Project (Rhode Island Coastal Resources Management Council 2010).

### B.1.4.1 Water Temperatures

Water temperature is seasonally variable and at the surface ranges from approximately 37°F in winter to 75°F in summer. Offshore temperatures also vary with depth and season due to seasonal stratification and thermoclines; for details, see the COP (Volume III, Section 5.1.2). Although waters on the OCS experience considerable vertical mixing in fall, winter, and spring, an important seasonal feature influencing finfish and invertebrates is the cold pool, a mass of cold bottom water in the Middle Atlantic Bight overlain and surrounded by warmer water. The cold pool forms in late spring and persists through summer, gradually moving southwest, shrinking, and warming due to vertical mixing and other factors (Chen et al. 2018). During summer, local upwelling and local mixing of the cold pool with surface waters provides a source of nutrients, influencing the ecosystem's primary productivity (Lentz 2017; Matte and Waldhauer 1984). The cold pool is a dynamic feature of the middle to outer portions of the OCS, but its nearshore boundary typically lies at depths from 66 to 131 feet (Brown et al. 2015; Chen et al. 2018; Lentz 2017). Offshore wind lease areas are mostly sited within depths less than 197 feet. While offshore wind foundation structures would affect local mixing of cool bottom waters with warm surface waters, the extent to which these local impacts may cumulatively affect the cold pool as a whole is not well understood. Given the size of the cold pool, approximately 11,580 square miles, (NOAA 2020a), future offshore wind structures as described in the expanded planned action scenario would not affect the cold pool, although they could affect local conditions.

#### B.1.4.2 Regional Ocean Forces

Clockwise movement around Georges Bank and flow toward the equator dominates large-scale regional water circulation, which is strongest in late spring and summer (Whitney 2015). The edge of the continental shelf creates a shelf-break front that encourages upwelling. Weather-driven surface currents, tidal mixing, and estuarine outflow all contribute to driving water movement through the area (Kaplan 2011). Variable temperature-salinity water masses occupying nearshore and offshore regions converge over Nantucket Shoals, creating a persistent frontal zone in the area. Offshore from the islands, shelf currents flow predominantly toward the southwest, beginning as water from the Gulf of Maine heading south veers around and over Nantucket Shoals. Tidal water masses from nearshore transitioning through Nantucket Sound mix with the shelf current generally following depth contours offshore.

Offshore water masses may extend northward onto the shelf toward the islands and through the OCS lease areas offshore Massachusetts at different times of the year (Ullman and Cornillon 1999), while nearshore waters appear to be affected by freshwater runoff in the spring and show increased sea surface temperature gradients extending seaward from Nantucket Sound tidal exit points. A southeasterly flow along the inner shelf depth contours from Nantucket Sound (Limeburner and Beardsley 1982) may be a factor in maintaining the frontal system over Nantucket Shoals. While the dynamics of this system may not be completely understood at this time, the variability observed in shelf water characteristics plays a role in supporting the diverse marine ecology present offshore New England.

#### B.1.4.3 Tides and Tidal Currents

Tidal range in the Nantucket Sound area is typically 2 to 3.3 feet, and tidal currents can exceed 3.5 knots in Muskeget Channel. Elsewhere, 1- to 1.5-knot flows run west to east in the Main Channel of Nantucket Sound (NOAA 2018a) immediately south of Horseshoe Shoal.

In the SWDA, previous studies found that currents are tidally dominated (Spaulding and Gordon 1982), with wind and density variations playing a smaller role. Data suggest that the depth-averaged current speed is approximately 0.6 knot and the surface current speed is approximately 0.7 knot. While there are no SWDA-specific observational data available, the applicant developed a three-dimensional tide- and wind-driven model described in COP Appendix III-A (Epsilon 2022). In the SWDA, the bottom flood current is predicted to move toward the northeast and the ebb current toward the southwest. Peak predicted current speeds are 0.4 to 0.6 knot (COP Appendix III-A; Epsilon 2022).

### B.1.4.4 Waves

In the Rhode Island Ocean Special Area Management Plan, average wave height ranges from 3 to 10 feet, and waves are likely to have little impact on the bottom at depth. Extreme wave height estimates range from 21 to 23 feet in a 10-year span to 29 to 30 feet in a 100-year span. Within the SWDA, the annual average of the monthly average significant wave height is approximately 4.3 feet and a maximum significant wave height of 19.7 feet. The annual average of the monthly average wave period is approximately 5.3 seconds (Rhode Island Coastal Resources Management Council 2010).

In many portions of Nantucket Sound, wave heights are limited by the short distance over which the wind can generate waves. This effect can be dramatic in places close to shore, such as a west wind off Chappaquiddick Island or a north wind offshore from the Cape. In addition, the presence of shoals (e.g., Muskeget area, Horseshoe Shoal) scattered around the area force the waves to increase in height locally and break, thereby diminishing further wave building.

Tidal currents can similarly play a role in modifying wave action nearshore. Wind-generated waves working against the tidal current quickly build and can develop standing waves under certain conditions. Conversely, a strong tidal current flowing in the same direction as the waves can actually diminish wave height as a result of the reduced opposing force. These effects come into play where large volumes of water are moving in and out of the Nantucket Sound, such as through Muskeget Channel and surrounding passages, as well as the channels north and south of Horseshoe Shoal.

The presence of offshore WTGs has the potential to alter wind-driven waves as they pass through the offshore facility (Swanson 2019). Generally, such changes are expected to reduce wave energy and would not be expected to result in increased shoreline erosion. Using computer modeling, Christensen et al. (2014) showed that an offshore wind facility located 2, 3, and 6 miles offshore would have a beneficial impact on shoreline accretion that decreased as the offshore wind facility distance from shore increased. While the general model estimated some parameters that may not be directly comparable to the proposed Project, the model shows that an offshore wind energy facility at any distance will decrease wave energy, with effects similar to a breakwater. As such, shoreline erosion is not expected to increase as a result of the proposed Project (Swanson 2019).

### B.1.4.5 Potential General Impacts of Offshore Wind Facilities

There have been relatively few studies to analyze the impact of offshore wind facilities on oceanographic processes, primarily due to the fact that changes to these processes are often highly localized and difficult to measure relative to the natural variability of the environment. Further, the studies that exist tend to focus on direct structural impacts. Even less readily available are analyses on wind-wave interaction impacts because the physics behind this interaction are difficult to quantify, model, and validate. Studies conducted thus far rely heavily on small scale tank testing and ocean modeling rather than actual site measurements. These studies have shown, however, that the magnitude of the impact foundations have on oceanographic conditions depends on pile diameter, turbine density, and facility layout. For example, larger diameter piles have a greater impact than the smaller piles used for jacket foundations.

Tank and modeling tests, such as those conducted by Miles et al. (2017) and Cazenave et al. (2016), conclude that mean flows are reduced/disrupted immediately downstream of a monopile foundation but return to background levels within a distance proportional to the pile diameter (D). These results indicate disruptions for a horizontal distance anywhere from 3.5 D to 50 D, depending on whether it is a current-only regime or a wave and current regime, and a width of 65.6 to 164 feet. Thus, for foundations like those proposed by Vineyard Wind, background conditions would be expected from 164 to 1,148 feet downstream from each monopile foundation. Cazenave et al. (2016) also conducted a shelf-scale modeling exercise on the Irish Sea, home to Walney (+extensions) and west of Duddon Sands, contiguous offshore wind facilities that together contain 297 turbines (with 1.4 gigawatts total power generation capacity). The shelf-scale model of the eastern Irish Sea indicated a 5 percent reduction in peak water velocities and found that this reduction may extend up to approximately 0.5 nautical mile (0.57 mile) downstream of a monopile foundation; impacts varied based on array geometry. In general, modeling studies indicate that water flow typically returns to within 5 percent of background levels within a relatively short distance from the structure. Modeling studies, such as the one conducted by Broström (2008), indicate that the combined impact of wind and oceanographic changes anticipated at offshore wind facilities may have the potential to alter upwelling patterns localized to the wind facility. This experiment was modeled assuming a shallow water depth of 65.62 feet and included additional boundary assumptions. Further modeling studies, such as Carpenter et al. (2016), indicate that offshore wind facilities could impact large-scale stratification in the German Bight but only when they occupy extensive shelf regions, not at current capacity. Nearly all tank and modeling studies indicate that further studies using more realistic systems are required.

As evaluated in Swanson (2019), export cable-laying operations for the Vineyard Wind 1 Project are not expected to have a measurable impact on tidal flows that would result in increased shoreline erosion. The proposed Project export cables are similarly expected to not have measurable impacts because they would be laid adjacent to the Vineyard Wind 1 cables.

Vessel traffic may lead to shoreline erosion from vessel wakes, but this would be limited to approach channels and locations near ports and bays; given the amount and nature of vessel traffic, vessels associated with offshore wind energy would cause a negligible increase, if any, to wake-induced erosion of associated channels (BOEM 2019).

### B.1.5 Biological Resources

This section discusses the biological resources present in the vicinity of the proposed Project. Potential impacts on biological resources are assessed in detail in Sections 3.6 through 3.9 and G.2.3 through G.2.5 of the Draft Environmental Impact Statement (EIS).

#### B.1.5.1 Sea Life

Moderate productivity and a mostly sand bottom, which has a large impact in shaping the biological resources of the area, characterize the marine areas near the proposed Project.

**Marine Mammals**

Marine mammals use the coastal waters of the northwest Atlantic OCS and the proposed Project area for feeding, breeding, nursery grounds, socializing, and migration (Stone et al. 2017; Leiter et al. 2017). Around 15 species of marine mammals, many of which are migratory, are likely to occur within the proposed Project area (Table 3.7-1 in EIS Section 3.7, Marine Mammals). In particular, the federally endangered North Atlantic right whale (NARW; *Eubalaena glacialis*) frequents the area. Accordingly, several marine zones near the proposed Project are managed using seasonal or year-round restrictions to protect right whales and their habitats. The COP (Volume III, Section 6.7; Epsilon 2022) and BOEM 2014 present a list of all marine mammals that may occur in the area and corresponding detailed descriptions.

Marine mammals are highly migratory, and seasonal occurrences near the proposed Project vary for each species. The biological assessment (BA) includes distribution maps of the listed species near the proposed Project and details regarding their seasonal occurrence (BOEM 2022a). Seasonal distributions for humpback whales (*Megaptera novaeangliae*), minke whales (*Balaenoptera acutorostrata*), harbor porpoise (*Phocoena phocoena*), and three dolphin species in the proposed Project area are shown on Figures 3.7-1 through 3.7-4 in EIS Section 3.7. The applicant submitted comprehensive acoustic modeling of underwater sound propagation and potential impacts on marine species during piling installation for the proposed Project (COP Appendix III-M; Epsilon 2022) that provided detailed information for the pile-driving analysis.

**Finfish and Other Species of Commercial Importance**

Resident and migratory finfish species, as well as demersal (bottom feeders) and pelagic (inhabiting the water column) types, occur in portions of the Rhode Island and Massachusetts Lease Areas (RI/MA Lease Areas) and within the SWDA. Many of these species have designated essential fish habitat (EFH), a delineation of important marine and diadromous (migratory between salt and fresh waters) fish habitat for all federally managed species mandated through the Magnuson-Stevens Fishery Conservation and Management Act in the Code of Federal Regulations, Title 50, Part 600 (50 CFR Part 600) (BOEM 2022b). A complete list of species with EFH near the proposed Project can be found in BOEM 2022b. Table B.1-7 shows some of the most significant species occurring in this area and indicates species of commercial/recreational importance. For more information on commercial and for-hire recreational fishing activities and species, see EIS Section 3.9, Commercial Fisheries and For-Hire Recreational Fishing, and BOEM 2022b.

**Benthic Invertebrates**

Typical invertebrates in the region include polychaetes (bristle worms), crustaceans (particularly amphipods), mollusks (gastropods and bivalves), echinoderms (e.g., sand dollars, brittle stars, and sea cucumbers), and various others (e.g., sea squirts and burrowing anemones) (BOEM 2014). Overall, the region experiences strong seasonality in water temperature and phytoplankton concentrations, with corresponding seasonal changes in the densities of benthic organisms (COP Volume III, Section 6.5; Epsilon 2022).

The SWDA is part of the southern New England shelf as described by Theroux and Wigley (1998), which has a higher biomass and density of benthic fauna than neighboring geographic areas such as the Gulf of Maine and Georges Bank. Common sand dollars (*Echinarachnius parma*) are abundant in the SWDA, as are hydrozoans, bryozoans, hermit crabs, euphausiids, sea stars, anemones, sand shrimp (*Crangon septemspinosa*), nematode worms, pandalid shrimp, and fig sponge (*Suberites ficus*) (COP Volume III, Section 6.5; Epsilon 2022). Polychaete worms and amphipod crustaceans dominate infaunal assemblages. These are all common in the Nantucket Shelf region. Similar communities exist near Cape Cod along the proposed OECCs landfall sites, with abundant nut clams, polychaetes, and amphipods, as well as oligochaetes and nemertean ribbon worms (COP Volume III, Section 6.5; Epsilon 2022). As mentioned in Table B.1-7, the region is also home to commercially important benthic invertebrates, including American lobster (*Homarus americanus*), Atlantic sea scallop (*Placopecten magellanicus*), Atlantic surf clam (*Spisula solidissima*), and ocean quahog (*Arctica islandica*), among others.

**Sea Turtles**

Four species of sea turtles may occur near the proposed Project area: leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), and green (*Chelonia mydas*). Each of these is protected under the Endangered Species Act (ESA; EIS Section 3.8, Sea Turtles). All these sea turtles are migratory and enter New England waters primarily in the summer and fall. However, hawksbill sea turtles (*Eretmochelys imbricata*) are rarely sighted in Massachusetts and are unlikely to occur near the proposed Project area. The other species may use the proposed Project area for travel, foraging, diving at depth for extended periods, and possibly for extended rest periods on the seafloor (COP Volume III, Section 6.8; Epsilon 2022). Targeted surveys have been conducted for sea turtles near the proposed Project area, and the results can be found in Kraus et al. (2016a). A more detailed discussion regarding aspects of sea turtles potentially affected is available in the proposed Project BA (BOEM 2022a).

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**Table B.1-7: Major Finfish and Invertebrate Species in Southern New England**

| Common Name | Scientific Name | Regional Species | Proposed Project Area Species | Listing Status | Federally Managed, EFH in SWDA | Federally Managed, EFH in OECC | Resident[a] | Migratory[a] | Benthic[b] | Demersal[b] | Pelagic[b] | Commercial/Recreational Importance | Current Condition (Source) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alewife | *Alosa pseudoharengus* | X | X | | | | | X | | | J A | X | Depleted (NMFS 2019) |
| American eel | *Anguilla rostrata* | X | X | | | | | X | | | A | X | Depleted (ASMFC 2017) |
| American lobster | *Homarus americanus* | X | X | | | | | X | E J A | | L | X | Declining (ASMFC 2015) |
| American sand lance | *Ammodytes americanus* | X | X | | | | X | | | E J A | | X | Common (Staudinger et al. 2020) |
| American shad | *Alosa sapidissima* | X | X | | | | | X | | | J A | X | Depleted (ASMFC 2020) |
| Atlantic albacore tuna | *Thunnus albacares* | X | X | | X | X | | X | | | J A | X | Above target population levels (NOAA undated a) |
| Atlantic bluefin tuna | *Thunnus thynnus* | X | X | | X | X | | X | | | J A | X | Unknown overfished status, not undergoing overfishing (ICCAT 2017) |
| Atlantic butterfish | *Peprilus triacanthus* | X | X | | X | X | | X | | | E L J A | X | Common (Guida et al. 2017) |
| Atlantic cod | *Gadus morhua* | X | X | | X | X | | X | | J A | E L | X | Significantly below target population levels (NOAA undated b), overfished (NEFSC 2017) |
| Atlantic croaker | *Micropogonias undulatus* | X | | | | | X | | | J A | E L | X | Stable (CBP undated b) |
| Atlantic herring | *Clupea harengus* | X | X | | X | X | | X | | | L J A | X | Common (Guida et al. 2017) |
| Atlantic horseshoe crab | *Limulus polyphemus* | X | X | | | | X | | E J A | | L | X | Neutral (ASMFC 2019b) |
| Atlantic mackerel | *Scomber scombrus* | X | X | | X | X | | X | | | E L J | X | Significantly below target population levels (NOAA undated c), overfished, undergoing overfishing (NEFSC 2018a) |
| Atlantic menhaden | *Brevoortia tyrannus* | X | X | | | | | X | | | E L J A | X | Stable (SEDAR 2020) |
| Atlantic salmon | *Salmo salar* | X | | X | | | | X | | | J A | | Endangered (BOEM 2022b) |
| Atlantic sea scallop | *Placopecten magellanicus* | X | X | | X | X | X | | E L J A | | L | X | Common (NEFSC 2018b) |
| Atlantic skipjack tuna | *Katuwonus pelamis* | X | X | | X | X | | X | | | J A | X | Above target population levels (NOAA undated d) |
| Atlantic sturgeon | *Acipenser oxyrinchus oxyrinchus* | X | X | X | | | | X | | | A | | Endangered (BOEM 2022a) |
| Atlantic surf clam | *Spisula solidissima* | X | X | | X | X | X | | J A | | | X | Above target population levels (NOAA undated e) |
| Atlantic wolffish | *Anarhichas lupus* | X | X | | X | X | X | | | E J A | L | | Overfished, not undergoing overfishing (NEFSC 2017) |
| Atlantic yellowfin tuna | *Thunnus albacares* | X | X | | X | X | | X | | | J A | X | Above target population levels (NOAA undated f) |
| Barndoor skate | *Dipturus laevis* | X | X | | X | | X | | | J A | | | Depleted (Oceana undated) |
| Basking shark | *Cetorhinus maximus* | X | X | | X | | | X | | | J A | | Declining (Rigby et al. 2019a) |
| Bay scallops | *Argopecten irradians* | X | X | | | | X | | A | L | | X | Depleted (MBA 2017) |
| Black drum | *Pogonias cromis* | X | | | | | X | | | J A | | X | Stable (CBP undated c) |
| Black sea bass | *Centropristis striata* | X | X | | X | X | | X | | J A | | X | Not overfished, not undergoing overfishing (SEDAR 2018) |
| Blue mussel | *Mytilus edulis* | X | X | | | | X | | A | L | | X | Abundance levels of moderate concern (Safina Center and MBA 2017) |
| Blue shark | *Prionace glauca* | X | X | | X | X | | X | | | J A | | Declining (Rigby et al. 2019b) |
| Blueback herring | *Alosa aestivalis* | X | X | | | | | X | | | J A | X | Depleted (NMFS 2019) |
| Bluefish | *Pomatomus salatrix* | X | X | | X | X | | X | | | J A | X | Depleted (ASMFC 2019a) |
| Channeled whelk | *Busycotypus canaliculatus* | X | X | | | | X | | E J A | | | X | Depleted and declining (MA DMF 2020) |
| Cobia | *Rachycentron canadum* | X | X | | X | X | | X | | | E L J A | X | Above target population levels (NOAA undated g) |
| Common thresher shark | *Alopias vulpinus* | X | X | | X | X | | X | | | J A | | Unknown (NOAA undated h) |
| Dusky shark | *Carcharhinus obscurus* | X | X | | X | X | | X | | | J A | | Declining (Rigby et al. 2019c), overfished (SEDAR 2016) |
| Eastern oyster | *Crassostrea virginica* | X | X | | | | X | | A | | L | X | Stable (CBP undated a) |
| Giant manta ray | *Manta birostris* | X | | X | | | | X | | | J A | | Endangered (BOEM 2022a) |
| Haddock | *Melanogrammus aeglefinus* | X | X | | X | X | | X | | | E L | X | Above target population levels (NOAA undated i) |
| Jonah crab | *Cancer borealis* | X | X | | | | | X | E J A | | L | X | Unknown (NOAA undated j) |
| King mackerel | *Scomberomorus cavalla* | X | X | | X | X | | X | | | E L J A | X | Above target population levels (NOAA undated k) |
| Knobbed whelk | *Busycon carica* | X | X | | | | X | | E J A | | | X | Depleted and declining (MA DMF 2020) |
| Little skate | *Leucoraja erinacea* | X | X | | X | X | X | | | J A | | X | Common (Guida et al. 2017) |
| Longfin squid | *Doryteuthis pealeii* | X | X | | X | X | | X | E | | J A | X | Common (Guida et al. 2017) |
| Monkfish | *Lophius americanus* | X | X | | X | X | X | | | J A | E L | X | Above target population levels (NOAA undated l) |
| Northern sea robin | *Prionotus carolinus* | X | X | | | | | X | | J A | E L | | Stable (CBP undated d) |
| Northern shortfin squid | *Illex illecebrosus* | X | X | | | X | | X | | | A | X | Unknown (NOAA undated p) |
| Ocean pout | *Zoarces americanus* | X | X | | X | X | | X | | E J A | | X | Overfished, not undergoing overfishing (NEFSC 2017) |
| Ocean quahog | *Arctica islandica* | X | X | | X | | X | | J A | | | X | Above target population levels, declining (NOAA undated m) |
| Pollock | *Pollachius virens* | X | X | | X | | | X | | J | E L | X | Above target population levels (NOAA undated n) |
| Porbeagle shark | *Lamna nasus* | X | X | | X | | | X | | | J A | | Stable, overfished but not undergoing overfishing (Curtis et al. 2016) |
| Red hake | *Urophycis chuss* | X | X | | X | X | | X | | J A | E L | X | Common (Guida et al. 2017) |
| Sandbar shark | *Carcharhinus plumbeus* | X | X | | X | X | | X | | | J A | | Declining (Musick et al. 2009) |
| Sand tiger shark | *Carcharias taurus* | X | X | | X | X | | X | | | J A | | Species of concern, declining (NOAA 2010) |

| Common Name | Scientific Name | Regional Species | Proposed Project Area Species | Listing Status | Federally Managed, EFH in SWDA | Federally Managed, EFH in OECC | Resident[a] | Migratory[a] | Benthic[b] | Demersal[b] | Pelagic[b] | Commercial/Recreational Importance | Current Condition (Source) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Scup | *Stenotomus chrysops* | X | X | | X | X | | X | | J A | | X | Common (Guida et al. 2017) |
| Shortfin mako shark | *Isurus oxyrinchus* | X | X | | X | | | X | | | J A | | Significantly below target population levels (NOAA undated o), overfished and undergoing overfishing (ICCAT 2017) |
| Shortnose sturgeon | *Acipenser brevirostrum* | X | | X | | | | X | | A | | | Endangered (BOEM 2022a) |
| Silver hake | *Merluccius bilinearis* | X | X | | X | X | | X | | | E L J | X | Common (Guida et al. 2017) |
| Smooth dogfish | *Mustelus canis* | X | X | | X | X | | X | | | J A | | Not overfished, not undergoing overfishing (SEDAR 2015) |
| Spanish mackerel | *Scomberomorus maculatus* | X | X | | X | X | | X | | | E L J A | X | Above target population levels (NOAA undated q) |
| Spiny dogfish | *Squalus acanthias* | X | X | | X | X | | X | | A | A | X | Common (Guida et al. 2017) |
| Spot | *Leiostomus xanthurus* | X | | | | | | X | | J A | E L J A | | Stable (CBP undated e) |
| Spotted sea trout | *Cynoscion nebulosus* | X | | | | | X | | | E L J A | | X | Overfished, undergoing overfishing (ASMFC 2011) |
| Striped bass | *Morone saxatilis* | X | X | | | | | X | | J A | J A | X | Significantly below target population levels (NOAA undated r), overfished, undergoing overfishing (NEFSC 2019) |
| Summer flounder | *Paralichthys dentatus* | X | X | | X | X | | X | | J A | E L | X | Below target population levels (NOAA undated s) |
| Tautog | *Tautoga onitis* | X | X | | | | | X | | E L J A | E | X | Overfished, undergoing overfishing (ASMFC 2016) |
| Tiger shark | *Galeocerdo cuvier* | X | X | | X | | | X | | | J A | X | Declining (Ferreira and Simpfendorfer 2019) |
| Weakfish | *Cynoscion regalis* | X | | | | | | X | | | E L J A | X | Depleted (ASMFC 2019c) |
| White hake | *Urophycis tenuis* | X | X | | X | X | | X | | J | E L J | X | Not overfished, not undergoing overfishing (NEFSC 2017) |
| White shark | *Carcharadon carcharias* | X | X | | X | X | | X | | | J A | X | Declining (Rigby et al. 2019d) |
| Windowpane flounder | *Scophthalmus aquosus* | X | X | | X | X | | X | | J A | E L | X | Not overfished, not undergoing overfishing (NOAA 2018b) |
| Winter flounder | *Pseudopleuronectes americanus* | X | X | | X | X | | X | | L | E J A | X | Significantly below target population levels (NOAA undated t), overfished, not undergoing overfishing (NEFSC 2015) |
| Winter skate | *Leucoraja ocellata* | X | X | | X | X | | X | | J A | | X | Common (Guida et al. 2017) |
| Witch flounder | *Glyptocephalus cynoglossus* | X | X | | X | X | | X | | | E L | X | Overfished (NEFSC 2017) |
| Yellowtail flounder | *Limanda ferruginea* | X | X | | X | X | | X | | J A | E L | X | Significantly below target population levels (NOAA undated u), overfished, undergoing overfishing (NEFSC 2015) |

A = adult; E = egg; EFH = essential fish habitat; L = larvae; J = juvenile; OECC = offshore export cable corridor; SWDA = Southern Wind Development Area

[a] Migration encompasses movements potentially affecting the presence of a species in the proposed Project area. It includes short inshore/offshore seasonal movements (e.g., flatfish, skates), as well as long-distance migrations (e.g., tuna).

[b] Habitat use was separated by life stage based on information from several sources (ASMFC 1998; ASMFC 2018a; BOEM 2018; Collette and Klein-MacPhee 2002; Miller and Klimovich 2017; Nelson et al. 2018; Roberts 1978). Some species with EFH in the proposed Project area did not have EFH designation for all life stages, while for other species, some life stages may not occur near the proposed Project.

Strandings data for sea turtles from 1998 to 2017, sightings per unit effort (SPUE), indicate similar trends in the seasonal occurrence for loggerhead, leatherback, Kemp's ridley, and unidentified sea turtles in the proposed Project area (Figures 3.8-2 through 3.8-5 in EIS Section 3.8). These SPUE maps do not depict the full level of distribution of a species in an area, but rather show the number of animal SPUE where surveys occurred. Additional information on sea turtle occurrence in the proposed Project area is available in the Vineyard Wind 1 BA (BOEM 2022a).

#### B.1.5.2 Terrestrial Resources

**Habitats**

The terrestrial portion of the proposed Project is located within the Long Island-Cape Cod Coastal Lowland Major Land Resource Area. Much of this area exhibits sandy soils, mixed hardwood-softwood forests, and scrublands subject to periodic fires (USDA 2006). Pine-oak forest is one of the most common habitat types on Cape Cod. This area also includes important habitats such as coastal wetlands, isolated freshwater wetlands, and a few small streams, although none of these habitats are present at locations where proposed Project work would take place. Table G.2.5-1 in EIS Section G.2.5, Terrestrial Habitats and Fauna, shows some of the threatened and endangered plant species potentially occurring in this area.

**Land Animals**

Table G.2.5-2 in EIS Section G.2.5 lists terrestrial and coastal faunal resources that are known to occur near the proposed Project. Prominent animal communities include residents of woodlands (e.g., white-tailed deer [*Odocoileus virginianus*], fox [*Vulpes vulpes*], raccoon [*Procyon lotor*], among others), scrub grasslands (e.g., New England cottontail [*Sylvilagus transitionalis*], coyote [*Canis latrans*]), and wetlands (e.g., American beaver [*Castor canadensis*], muskrat [*Ondatra zibethicus*], diamondback terrapin [*Malaclemys terrapin*]). Amphibians and reptiles, including turtles, snakes, and a variety of frogs, may belong to several of these communities and may move between and among them.

### B.1.6 Protective Measures and Monitoring

Thus far, there is only one operational offshore wind facility on the Atlantic coast (Block Island Wind Farm), one under construction (Vineyard Wind 1 Project), and several more in various stages of development. This section highlights some of the lessons learned from the first U.S. project and projects in Europe regarding monitoring and mitigating impacts on the physical environment, including physical habitat.

#### B.1.6.1 Protective Measures

Scour was a significant concern and focus of the offshore wind facility industry after installation of monopile foundations in relatively shallow waters and mobile sediments resulted in extensive scour pits and scour fields (English et al. 2017). Extensive research was conducted on scour development, and best management practices (BMP) have been established to reduce scour occurrence. Current scour models are consistent with field data collected at offshore wind facilities, and mitigation measures for scour protection (e.g., rock placement) have been shown to be highly effective. At the moment, scour does not appear to be a major concern of offshore wind facility developers due to the effectiveness of scour protection as a mitigation, the accuracy of scour predictions, and the establishment of BMPs.

All COP submittals for offshore wind facilities to date, including the proposed Project COP, have included scour protection to mitigate the possibility of scour occurrence and monitoring programs to monitor scour both on a regular time schedule and with environmentally triggered monitoring, such as post storm event monitoring. These protective measures are in line with BMPs established by international industry stakeholders.

Survey data show the proposed Project seabed consists of fine-grained sediments that overlay coarse-grained sands. The mixed seabed and presence of fine-grained material indicates scour is less likely to occur; however, the applicant has proposed a conservative approach that includes the installation of scour protection around all foundations.

### B.1.6.2 Environmental Monitoring

Direct observations of the Block Island Wind Farm show turbidity associated with cable installation to be nearly indistinguishable from background turbidity measurements and 100 times lower than model predictions; overspill levee deposits were in line with model predictions (Elliot et al. 2017).

Scour around the foundation of the Block Island Wind Farm show about 0.66 foot of seabed lowering over 14 months with average monthly variability of up to 1.97 feet. Data appear to suggest a correlation between the greatest levels of scour and the highest significant wave heights, thus raising the possibility that increased wave action leads to increases scour during more extreme winter weather with some recovery during spring and summer months (HDR 2019).

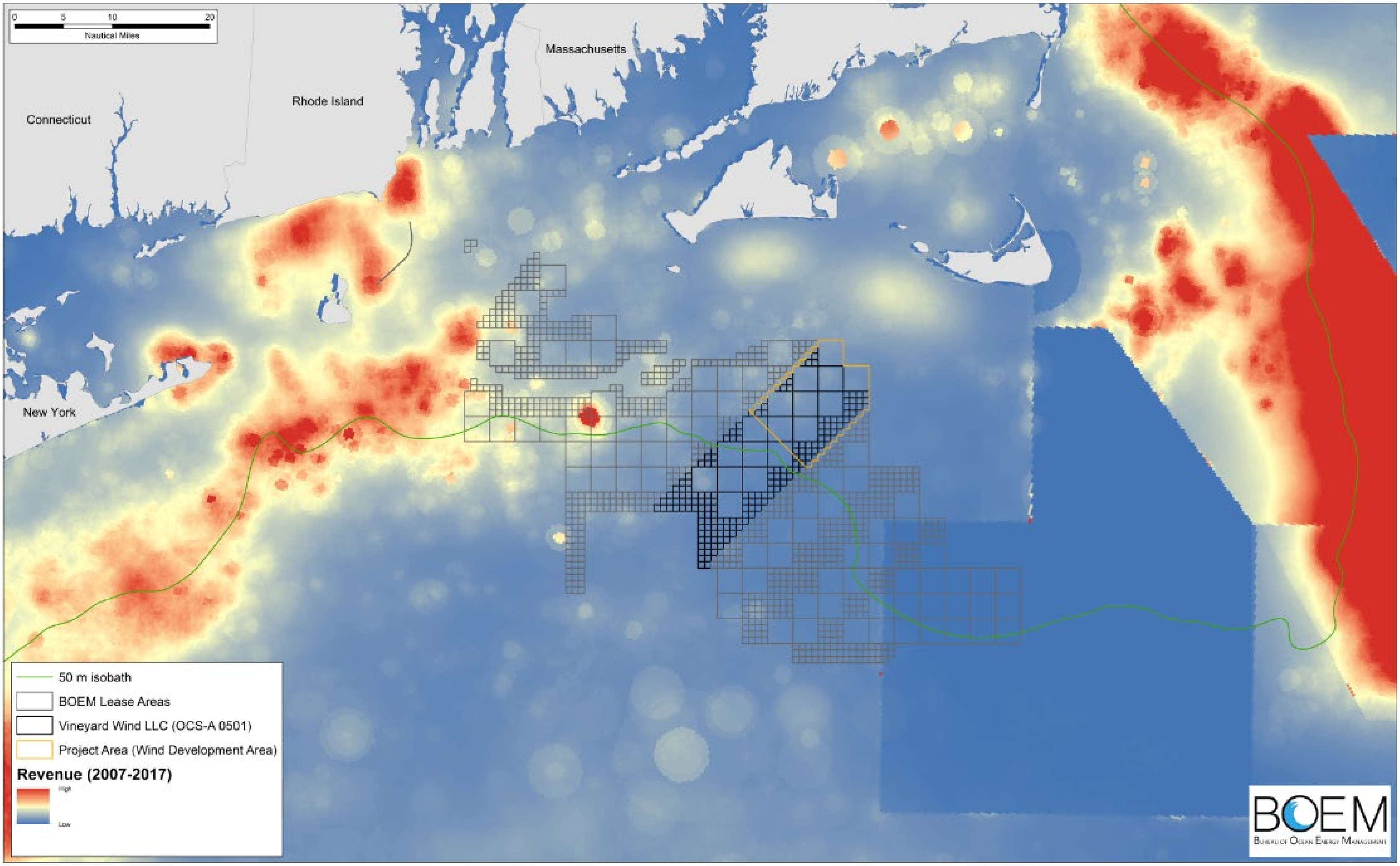
BOEM is working with state and federal partners to develop a regional monitoring strategy that focuses on biological resource impacts and builds off the lessons from Atlantic OCS and European wind development activities. Wind developers will also have site-specific monitoring requirements related to potential impacts that might be anticipated for their project. This includes monitoring of foundations for epibenthic growth, scour, and monitoring of cable burial effectiveness.

## B.2 Commercial Fisheries and For-Hire Recreational Fishing Data

The analysis in this section is reprinted (with revisions to clarify geographic locations, project names, and figure and table numbers) from the Final EIS for the Vineyard Wind 1 Project (BOEM 2021) and reflects data, information, and trends through 2018. While more recent data may be available, the Vineyard Wind 1 information remains valid to broadly characterize and support the analysis of the New England Wind Project's impacts on commercial fisheries and for-hire recreational fishing in EIS Section 3.9.

The fisheries resources in federal waters off New England provide a significant amount of revenue. New Bedford, Massachusetts, has consistently been the highest value-producing U.S. fishing port (NOAA 2018c). In 2018, commercial fisheries harvested more than 1.2 billion pounds of fish and shellfish in the North and Mid-Atlantic region, for a total landed value of over $1.8 billion; from 2009 to 2018, average annual landings were 1.3 billion pounds with a value of $1.6 billion (ACCSP 2018). From 2009 to 2018, the value of landings has ranged from $1.2 billion to over $1.8 billion, while landings weight ranged from 1.16 billion pounds to 1.40 billion pounds. In Massachusetts, commercial fisheries harvested over 222 million pounds of fish and shellfish in 2018 for a total landed value of over $630 million.

Commercial fisheries in the northeast United States are known for the large landings of herring, menhaden, clam, squid, scallop, skate, and lobster, as well as being a notable source of profit from scallop, lobster, clam, squid, and other species (NOAA 2019d). Figure B.1-6 shows fishing revenue intensity in the region around the Vineyard Wind 1 Project Wind Development Area (WDA); the fishing revenue is for all federally managed fisheries aggregated for the years 2007 to 2017 (Geret DePiper, Pers. Comm., April 2019). Commercial fisheries obtained the greatest concentration of revenue from around the 164-foot contour off Long Island and Georges Bank. The National Marine Fisheries Service (NMFS) excluded mobile gear fishing in parts of Georges Bank for fish stock rebuilding. Moderate revenue fishing areas (yellow on Figure B.1-6) are apparent within and in the vicinity of the WDA. Chart plotter data submitted by commercial vessels targeting squid and whiting (*Merlangius merlangus)* reflect fishing in these areas.




m = meter; NEFSC = Northeast Fisheries Science Center; VTR = vessel trip report
This is based on federally reported VTRs and conversion by NEFSC (Geret DePiper, Pers. Comm., April 2019). The top 5% of revenue was clipped to lessen high-value scallop revenue skew of regional revenue. Without clipping, the top 5 percent areas important to lesser value fisheries would not appear. Removing the top 5% does not remove any areas that are not already represented in the red (high) end of the color ramp.

**Figure B.1-6: Fishing Intensity Based on Average Annual Revenue for Federally Managed Fisheries (2007–2017)**

Over 4,300 federally permitted fishing vessels were in the northeast in 2017, landing fish in several major northeast ports (Table B.1-8) (NOAA 2019e). In 2018, at the New Bedford port, commercial fishing landed more than 113.5 million pounds of products valued at $438.8 million (Table B.1-8). Point Judith, Rhode Island, landed 47.5 million pounds in 2017, valued at $64.8 million. Table B.1-8 lists the value and volume of landings of selected regional ports. The regional setting extends primarily over the fishing ports and waters in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey, although vessels from other ports may occasionally operate in the area. Commercial vessels active in the RI/MA Lease Areas may be homeported and/or land product in ports in those states. Other ports such as Nantucket are much smaller but of importance to vessels homeported in those ports; however, for small ports, landing and fishing revenue data are often confidential because of the small number of fishing vessels involved. Unless noted otherwise, fishing revenue data in tables were converted to 2019 dollars using the quarterly, seasonally adjusted Gross Domestic Product Implicit Price Deflator provided by Federal Reserve Economic Data.

**Table B.1-8: Value and Volume of Commercial Fishery Landings by Port (2019 dollars), 2016–2018**

| | 2016 | 2017 | 2018 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|
| **Port** | **Pounds (millions)[a]** | | | **Value (million $)[a]** | | |
| New Bedford, Massachusetts | 106.6 | 110.8 | 113.5 | 346.7 | 406.0 | 438.8 |
| Cape May-Wildwood, New Jersey | 46.6 | 101.6 | 101.2 | 89.9 | 84.4 | 67.5 |
| Point Judith, Rhode Island | 53.4 | 44.3 | 47.5 | 59.1 | 59.8 | 64.8 |
| Hampton Roads Area, Virginia | 12.3 | 15.5 | 14.7 | 64.8 | 60.6 | 55.7 |
| Gloucester, Massachusetts | 63.4 | 63.9 | 59 | 55.6 | 54.8 | 54.2 |
| Provincetown-Chatham, Massachusetts | 26.5 | 22.3 | 22.5 | 34.8 | 35.2 | 35.4 |
| Reedville, Virginia | 321.3 | 319.9 | 352.5 | 33.1 | 33.9 | 36.8 |
| Point Pleasant, New Jersey | 26.3 | 37.5 | 43.3 | 34.1 | 36.8 | 33.0 |
| Long Beach-Barnegat, New Jersey | 7.2 | 7.6 | 6.3 | 28.6 | 25.7 | 24.7 |
| Atlantic City, New Jersey | 24.3 | 24.7 | 24.8 | 20.9 | 19.4 | 18.5 |
| Boston, Massachusetts | 12.2 | 15.8 | 17 | 18.1 | 18.0 | 16.7 |
| Montauk, New York | 11.8 | 10.1 | 11.3 | 17.3 | 15.4 | 17.6 |
| North Kingstown, Rhode Island | 17.6 | 27 | 22.8 | 14.5 | 18.4 | 16.3 |
| Accomac, Virginia | 7.6 | 5.9 | 6.2 | 21.3 | 13.3 | 12.3 |
| Fairhaven, Massachusetts | 3.9 | 3.2 | 3.2 | 23.1 | 10.7 | 8.6 |
| Newport, Rhode Island | 6.6 | 7.3 | 5.5 | 8.5 | 8.9 | 8.0 |
| Hampton Bay-Shinnicock, New York | 5.2 | 3.8 | 3.6 | 8.5 | 6.4 | 5.8 |
| Ocean City, Maryland | 4 | 4.4 | 4.2 | 6.1 | 4.8 | 4.9 |
| Stonington, Connecticut | 2.1 | 1.8 | | 6.3 | 6.5 | |
| New London, Connecticut | 9 | 5.6 | 7.2 | 5.4 | 2.8 | 4.3 |
| Chincoteague, Virginia | 2.4 | 1.9 | | 5.2 | 4.1 | |
| Belford, New Jersey | 2.5 | 5.1 | 4.9 | 3.2 | 2.8 | 1.9 |
| Little Compton, Rhode Island | | | 3.1 | | | 3.0 |
| Cape Charles-Oyster, Virginia | | 0.3 | | | 1.1 | |
| Greenport, New York | | 0.2 | | | 0.3 | |

Sources: NOAA 2019f, 2019g
[a] Empty cells indicate that data were not collected or not available.

The commercial fishing fleets contribute to the overall economy in the region through direct employment, income, and gross revenues, as well as products and services to maintain and operate vessels, seafood processors, wholesalers/distributors, and retailers. In 2015, commercial fisheries in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey created 61,865 jobs, generated $2,761 million in sales, and contributed $1,380 million in value added (gross domestic product; NOAA 2017a). In Massachusetts, of the 52,710 jobs created, commercial harvesters held 10,923 and retail created 39,323, with the remaining in seafood processing (1,509) and seafood wholesaling and distribution (955). Further, commercial harvesters received $302.5 million in income, retailers $369.6 million, seafood processors $83.1 million, and seafood wholesalers and distributors $55.2 million. In Rhode Island, of the 4,522 jobs created, 2,016 were held by commercial harvesters, and 2,107 were created in retail, with the remaining in seafood processing (284) and seafood wholesaling and distribution (115); commercial harvesters generated $42.5 million in income (NOAA 2017a).

Input-output models can be used to estimate the economic impacts associated with the harvesting of fish by commercial fishermen and the seafood industry. A study conducted by the University of Rhode Island (undated) on the *Economic Impacts of the Rhode Island's Fisheries and Seafood Sector* investigated the contributions of commercial fishing, charters, processing, professional service firms, retail and wholesale seafood dealers, service and supply firms, and tackle shops to assess their contributions to the state and national economy. The study concluded that the Rhode Island seafood industry generated 3,147 jobs and $538.3 million in gross sales with the total spillover effect to other industries of 4,381 jobs and output of $419.8 million. The vessel landings job multiplier was estimated at 32.43 jobs per $1.0 million, while the vessels landings economic impact multiplier was estimated at 1.98 (value added basis).

Table B.1-9 was provided by the NOAA Northeast Fisheries Science Center (NEFSC). NOAA NEFSC used the federal vessel trip report (VTR) to collect landings data. VTR data is collected by all NMFS permitted vessels, regardless of where fishing occurs or what species are targeted. The only federally permitted vessels not required to provide VTRs is the lobster fishery. Other non-federally permitted fisheries (e.g., Jonah crab [*Cancer borealis*] and menhaden) also do not have a federal reporting requirement. To compile data listed in Table B.1-9, NOAA NEFSC queried VTR data for positional data and linked it to dealer data for value and landings information. However, VTR data may misrepresent the actual location where the fish were harvested on a given trip. Fishermen are required to record the haul back position where the majority of fishing occurred, and separate VTRs are required only when fishermen change statistical areas or gear. Consequently, a single location can be used to record multiple tows, and this may not be representative of where fishing actually occurred.

The Rhode Island Department of Environmental Management (RI DEM) analysis (Table B.1-10) shows substantial variability in catch over time. Point Judith landings varied from just over $550,278 in 2011 to over $3.0 million in 2016, which coincides with a peak year for the squid industry that is primarily based in that port.[1] This information regarding the area's use as a fishery matches Point Judith- and Montauk-based vessel chart plotter data regarding the use of this area (Figure B.1-7). Similar variability in catch, likely due to squid landings, is shown for New Bedford, which had a landings revenue of $126,017 in 2011 and over $1.5 million in 2016. The RI DEM analysis identified New Bedford and Point Judith ports as having relatively higher value of landings from the Vineyard Wind 1 lease area.

[1] VMS was not required until 2014 for squid vessels.

**Table B.1-9: Value of Port Landings Harvested from the Vineyard Wind 1 Lease Area (Vessel Trip Report Data, 2019 Dollars), 2008–2017**

| Vineyard Wind 1 Lease Area | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|
| Montauk, New York | | | | | | | | $50,116 | $227,598 | $84,711 |
| New Bedford, Massachusetts | | $46,151 | $179,883 | $164,171 | $108,842 | | $107,469 | | $317,624 | |
| Point Judith, Rhode Island | $193,649 | $42,152 | $58,605 | $254,534 | $88,828 | $372,726 | $391,784 | $432,069 | $1,494,979 | $206,102 |
| Other ports | $100,830 | $168,845 | $214,111 | $108,652 | $354,925 | $473,058 | $167,723 | $177,539 | $429,707 | $84,735 |

Source: Benjamin Galuardi, Pers. Comm., April 3, 2019

Empty cells indicate that data were not collected or not available.

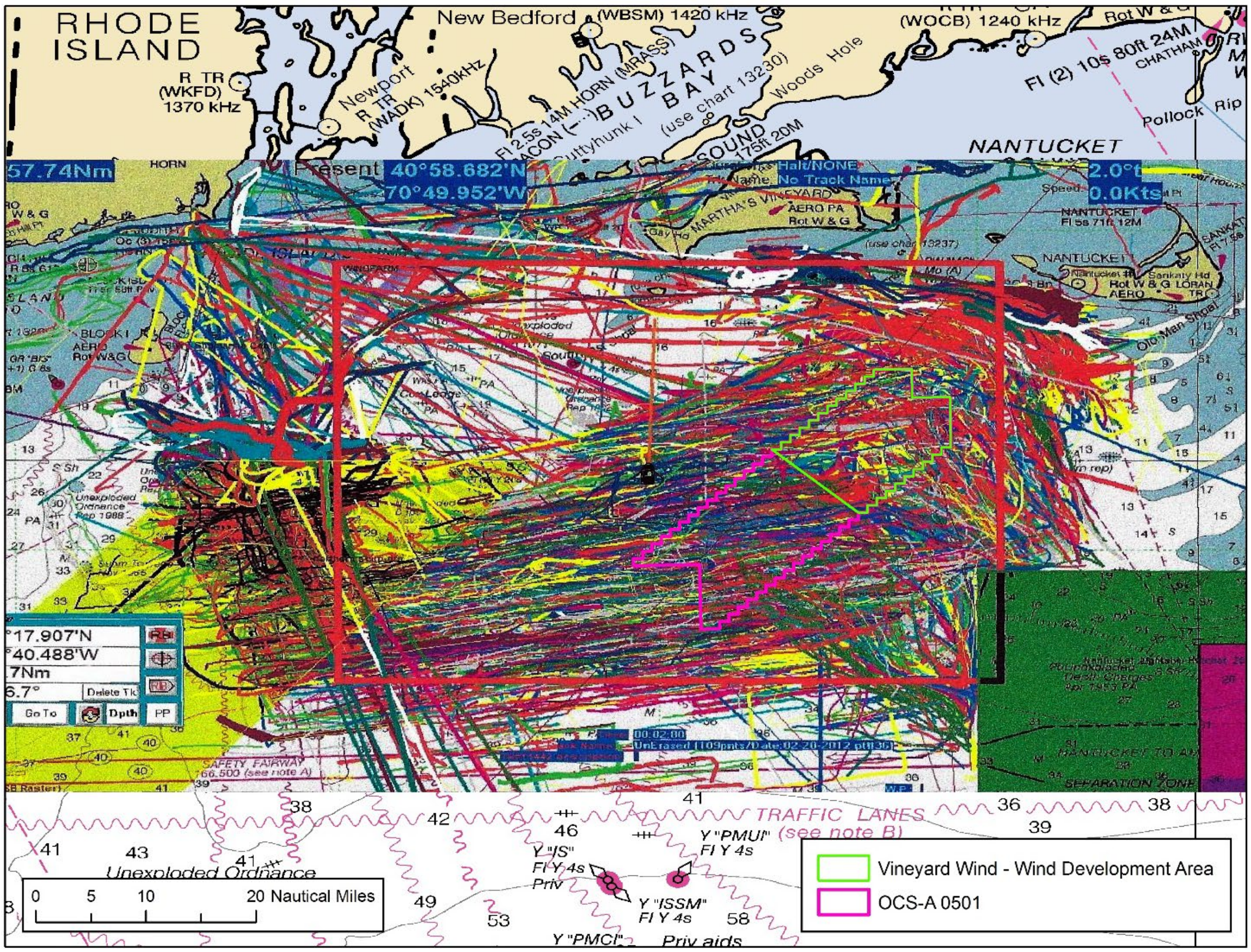
**Table B.1-10: Value of Port Landings Harvested from the Vineyard Wind 1 Lease Area (Vessel Monitoring System Data, 2019 Dollars), 2011–2016**

| Port | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| Montauk, New York | Confidential landings (fewer than three vessels) | Confidential landings (fewer than three vessels) | $295,840 | Confidential landings (fewer than three vessels) | $160,458 | $426,771 |
| New Bedford, Massachusetts | $126,017 | $1,768,982 | $1,227,439 | $793,864 | $590,584 | $1,547,916 |
| Point Judith, Rhode Island | $550,278 | $872,311 | $1,341,593 | $1,318,362 | $1,424,764 | $3,165,239 |
| Chatham, Massachusetts | $116,844 | $162,645 | $78,299 | $41,058 | Confidential landings (fewer than three vessels) | Confidential landings (fewer than three vessels) |
| New London, Connecticut | $63,854 | Confidential landings (fewer than three vessels) | Confidential landings (fewer than three vessels) | No landings | Confidential landings (fewer than three vessels) | Confidential landings (fewer than three vessels) |

Source: RI DEM 2017

The following ports were also considered; however, the data were either confidential (i.e., fewer than three separate contributors to the data) or there were no landings in those ports from the Vineyard Wind 1 lease area: Barnegat Light, NJ; Belford, NJ; Boston, MA; Cape May, NJ; Gloucester, MA; Hampton Bays, NY; Harwich Port, MA; Little Compton, RI; Mystic, CT; Newport, RI; North Kingstown, RI; Point Pleasant, NJ; Providence, RI; Provincetown Wharf, MA; Shinnecock Reservation, NY; Stonington, CT; Wakefield, RI; Westport, MA; and Woods Hole, MA.

Commercial Fisheries Center of Rhode Island - Chart Plotter Tow Tracks




Source: BOEM 2021

A general pattern of east to west or northeast to southwest (following Loran line orientation) fishing activity is apparent; however, a substantial number of tracks proceed in other directions.

**Figure B.1-7: Chart Plotter Tow Tracks near the Wind Development Area**

VTR data compiled by the NOAA NEFSC also show substantial variability in the year-to-year revenue (Table B.1-10). VTRs show that Point Judith landed a revenue of $1.5 million in 2016 compared to $3.2 million recorded by the vessel monitoring system (VMS) data (Table B.1-9). As another example, VMS data show a revenue of $872,311 in 2012 for Point Judith compared to $88,828 compiled from VTRs. In general, the total landed value in 2016 using VTRs is estimated at $2.5 million, substantially higher compared to the revenue landed in any other year in the investigated period (Table B.1-10). The differences in values with these two approaches are due to the different spatial data used (VTR point data versus VMS data) and the weighting done in the RI DEM analysis. Specifically, the RI DEM analysis took the raw fishing density maps by species caught to weight the value of fishing location points within each trip. Rather than assuming all fishing activity is equal, to scale the landings by the amount of fishing activity within each area per trip, each individual fishing point within a trip was weighted by the fishing density map for that fishery that year. Weighting the values based on fishing density places higher weights on points where the fishing density was higher. This strategy assumes that fishermen target the most profitable areas (i.e., where species abundances are higher) (RI DEM 2017). Together, these two approaches create a range of harvest revenue that occurred across the entire Vineyard Wind 1 lease area.

Table B.1-9 and Table B.1-10 show how various data collection and analysis methods (VMS versus VTR) can provide varying estimates of the fishing activity in the Vineyard Wind 1 lease area. More details about commercial fishing ports are available in the COP (Volume III, Section 7.6; Epsilon 2022).

The ports of Point Judith and New Bedford also support other economic activities through spending and job creation that depend on commercial and for-hire recreational fishing such as preparation and packaging of seafood, wholesale and retail seafood sales, purchase of fishing equipment, accommodation, and other goods and services related to commercial fishing.

Figure B.1-8 shows the relative squid fishing vessel density between 2015 and 2016 using VMS, both with all recorded squid fishing vessels traveling at any speed and speed filtered to show only those vessels traveling less than 4 knots. Figure B.1-9 shows the total number of unique squid fishing vessels (92) and orientation of fishing direction (roughly east to west) between 2014 and 2019 across the entire RI/MA Lease Areas. As previously noted, VMS as a source of location data for the squid fishery may underrepresent fishing activity prior to 2017. Also, VMS data show vessel presence but do not indicate whether the vessel is fishing or not. The presence of vessels traveling less than 4 knots may better indicate squid fishing activity because higher-speed vessels are more likely to be transiting.

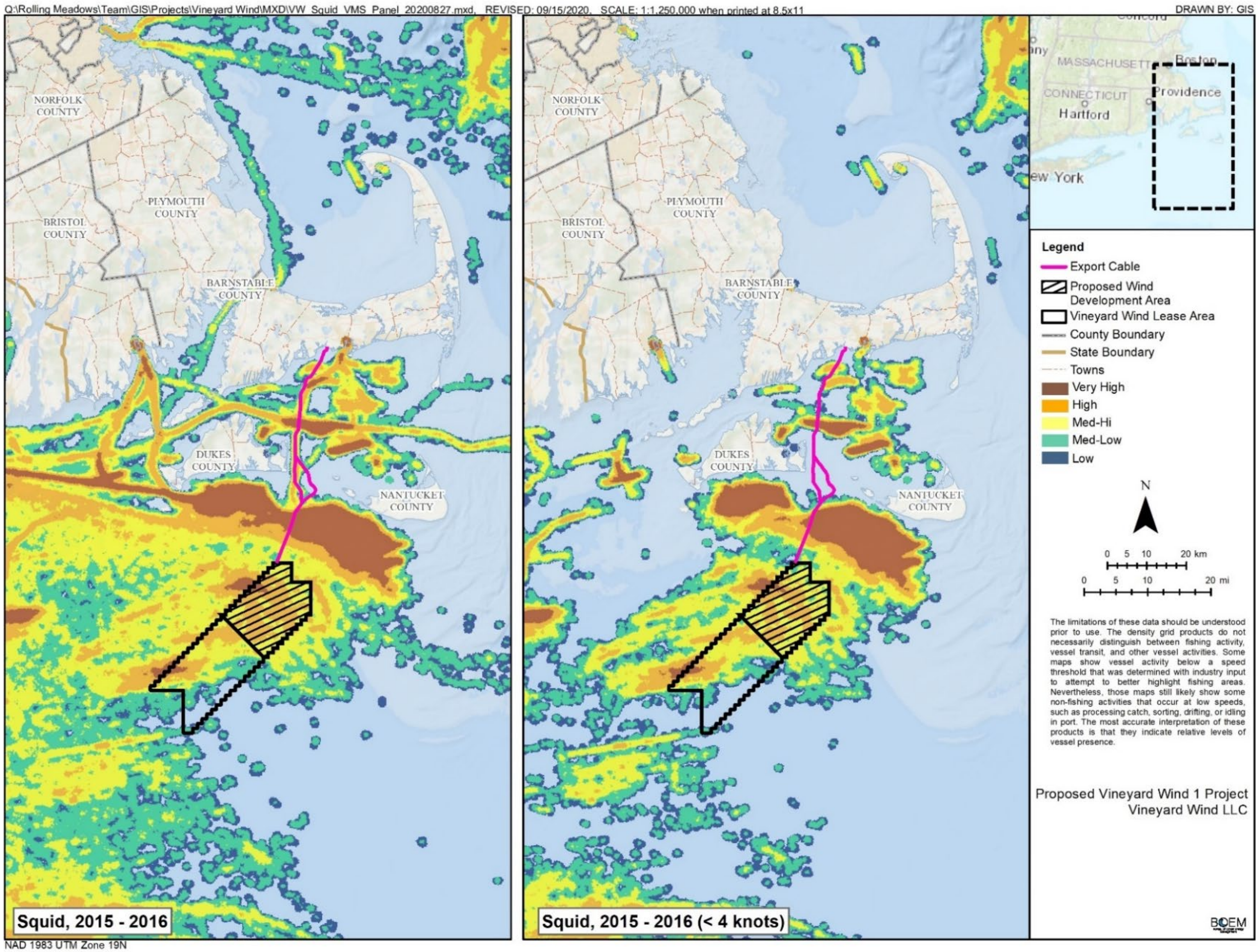
NOAA NEFSC also identified that more than $280,000[2] of lobster pot gear revenue comes from within the Massachusetts Wind Energy Area, which is primarily landed in Massachusetts (Kirkpatrick et al. 2017). After scallops, the state's second most valuable fishery is lobster, which has annual average landings of approximately $61 million. Much of the southern New England lobster fleet has transitioned to a mixed crustacean fishery targeting both Jonah crabs and lobsters (ASMFC 2022). Comments during scoping for the Vineyard Wind 1 and New England Wind EISs indicated that a majority of lobster effort is south and west of the proposed Project area (Figure B.1-10). However, lobster pot landings may be underestimated due to incomplete reporting for trap vessels that are not subject to mandatory reporting.

BOEM analyzed an expanded data set (Geret DePiper, Pers. Comm., August 2018) that is isolated to federally permitted commercial fishing activity within the WDA. Figure B.1-11 shows that commercial fisheries harvested $3.67 million in revenue in the Atlantic Mackerel, Squid, and Butterfish Fisheries Management Plan (FMP) and Atlantic surf clam and Ocean Quahog FMP over a 12-year period.

Looking at the value of catch within the WDA for each FMP as a percentage of the total revenue for each FMP in the region, the largest absolute shares occur in the Northeast Multispecies FMP (small mesh) and the Atlantic Mackerel, Squid, and Butterfish FMP, but in each case, less than 0.5 percent of the FMP's total revenue is harvested within the WDA.

Table B.1-11 and Table B.1-12 show the annual value of landings (2019 dollars) for the top seven FMPs in the WDA during 2007 to 2018. There has been substantial variability in the year-to-year harvest of various species in the WDA. NOAA NEFSC provided additional data on the value and volume of fishing in the WDA. The data are based on the VTRs; value of fishing is provided in 2019 dollars by species, gear, port, and state, while volume landed is provided in pounds (Table B.1-11 through Table B.1-20).

[2] This is based on 2007 to 2012 data and stated in 2015 dollars.




Source: Northeast Regional Ocean Council 2020

**Figure B.1-8: Squid Fishing Vessel Density Based on Vessel Monitoring System Data (2015–2016)**

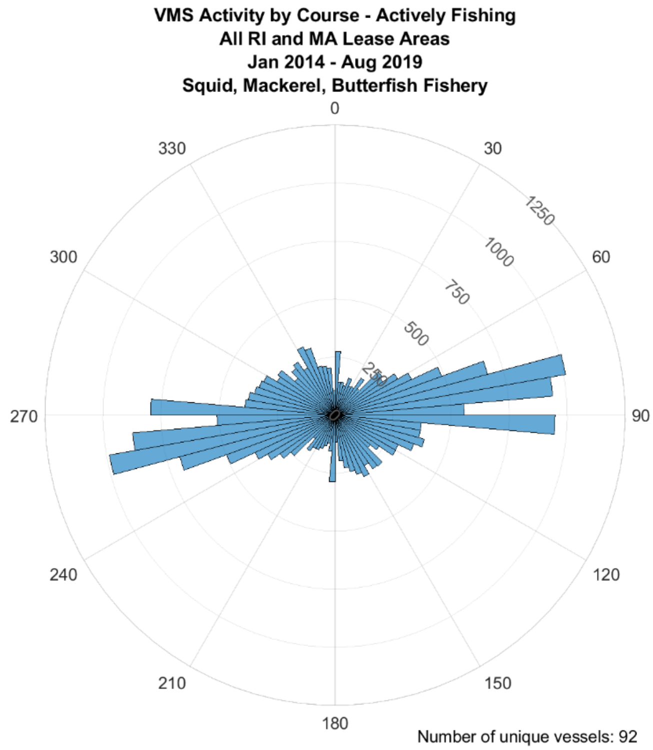
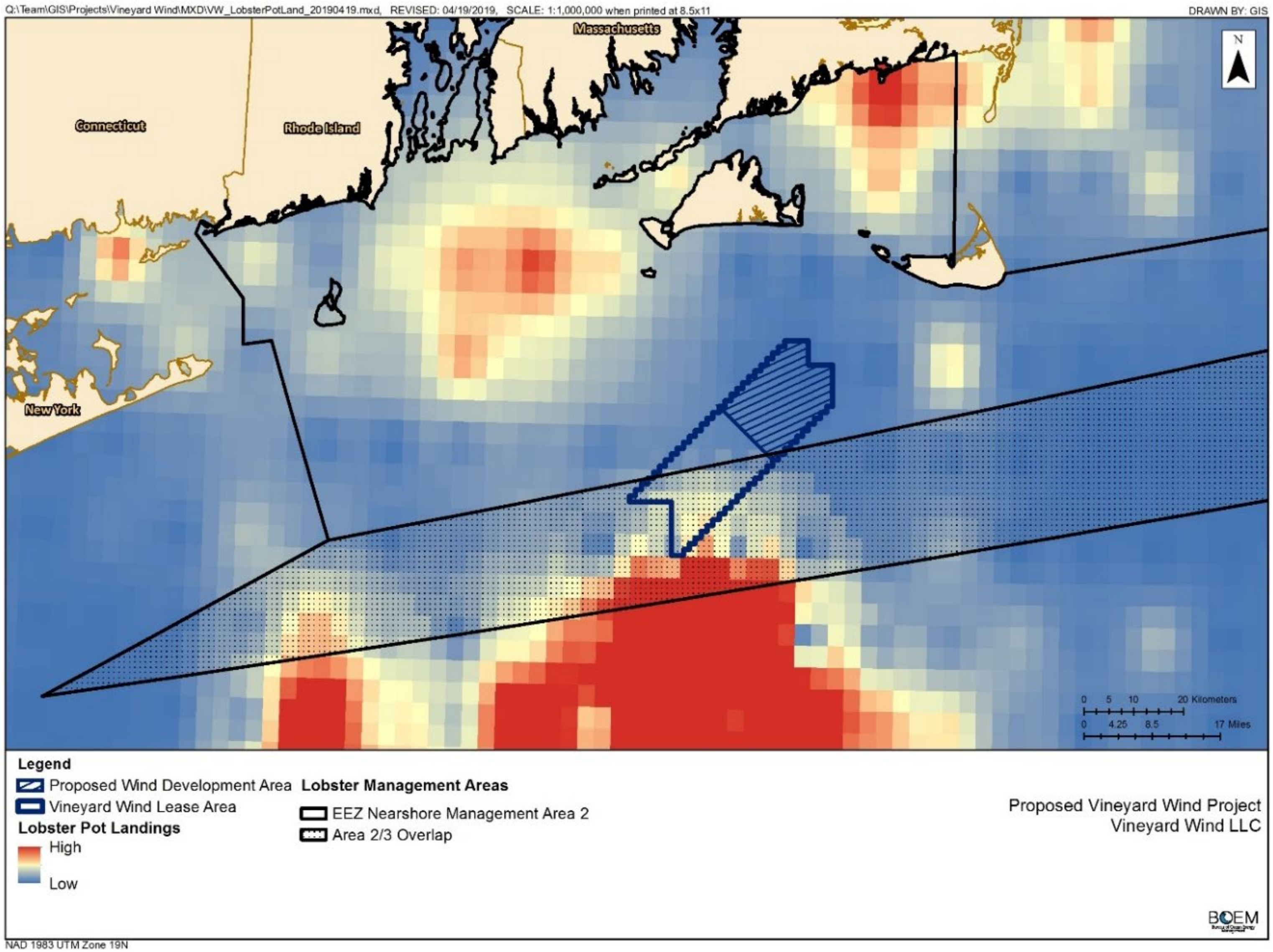



**Figure B.1-9: Squid, Mackerel, Butterfish Fishery in Rhode Island/Massachusetts Lease Areas—Fishing**

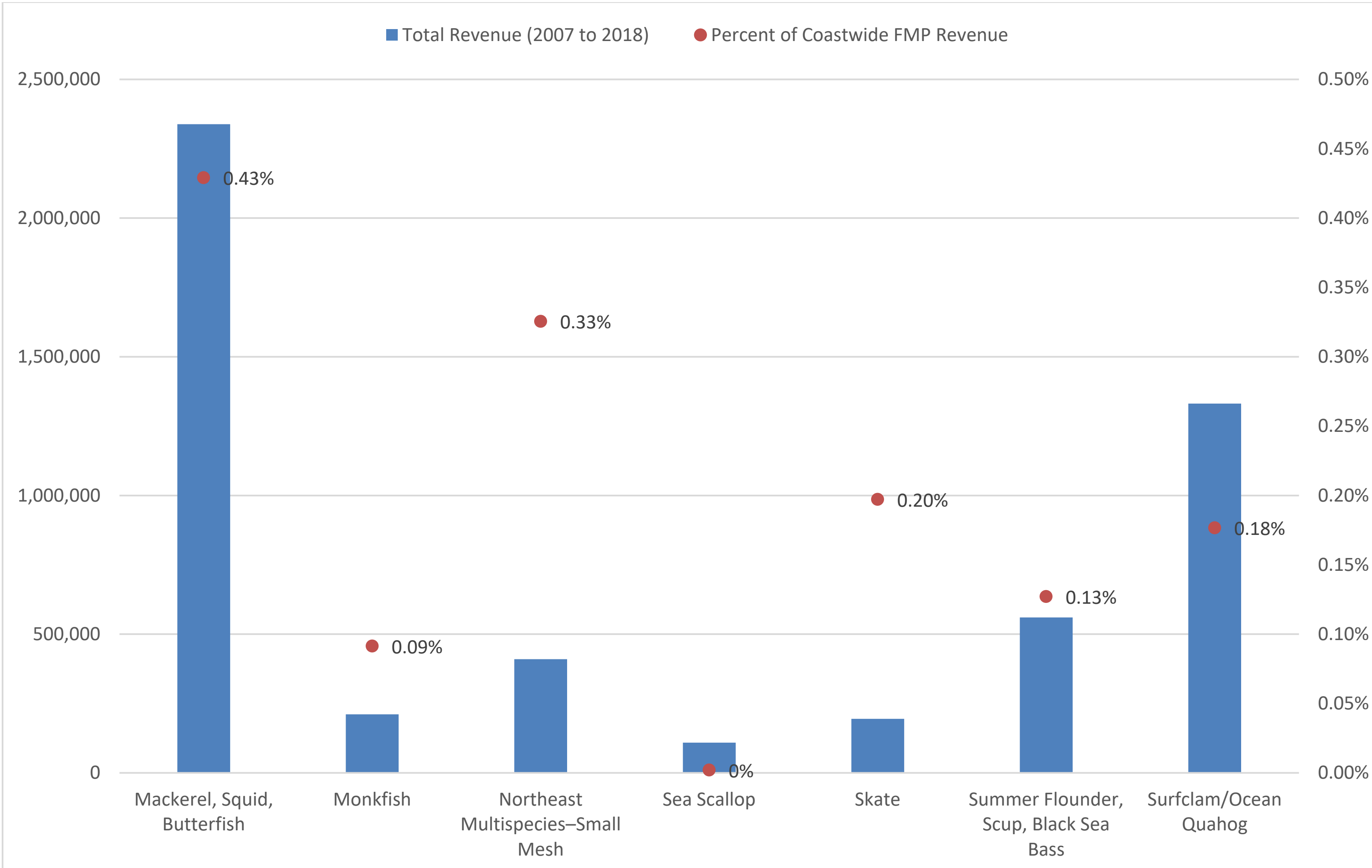
MA = Massachusetts; RI= Rhode Island; VMS = vessel monitoring system

Although Table B.1-11, Table B.1-12, and Table B.1-13 through Table B.1-20 are based on the same underlying VTR data, Table B.1-11 and Table B.1-12 use a VTR mapping model developed by the NMFS NEFSC. The VTR mapping model allows for a more conservative analysis using VTR data by taking into account some of the uncertainties around each reported point. Using observer data, for which precise locations are available, the model was developed to derive probability distributions for actual fishing locations around a provided VTR point. Other variables likely to affect the precision of a given VTR point, such as trip length, vessel size, and fishery, were also incorporated into the model. This model allows for generating maps that predict the spatial footprint of fishing. In this case, the modeled data indicate greater revenue exposure than that indicated by the VTR reported position alone over the same period.




EEZ = Exclusive Economic Zone

**Figure B.1-10: Lobster Pot Landings 2001–2010**




FMP = Fisheries Management Plan
Revenue was converted to 2019 dollars using the monthly, not seasonally, adjusted Producer Price Index by Industry for Fresh and Frozen Seafood Processing provided by the U.S. Bureau of Labor Statistics.

**Figure B.1-11: Top Seven Fisheries Management Plans with Harvests from the Wind Development Area (2007–2018)**

**Table B.1-11: Value of Landings by Fisheries Management Plan for the Wind Development Area (2019 Dollars), 2007–2018**

| FMP | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | Total | Annual Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mackerel, Squid, Butterfish | $11,390 | $156,363 | $133,246 | $36,666 | $114,983 | $161,675 | $98,477 | $193,134 | $236,455 | $978,455 | $131,544 | $86,104 | $2,338,493 | $194,874 |
| Monkfish | $24,348 | $4,937 | $4,927 | $16,982 | $34,421 | $47,055 | $17,757 | $11,904 | $10,631 | $22,636 | $8,347 | $7,111 | $211,056 | $17,588 |
| Northeast Multispecies–Small Mesh | $32,286 | $42,149 | $78,763 | $22,542 | $28,903 | $25,763 | $31,865 | $26,500 | $26,832 | $35,074 | $41,835 | $17,359 | $409,872 | $34,156 |
| Sea Scallop | $12,071 | $22,676 | $11,266 | $5,078 | $3,939 | $8,185 | $1,822 | $2,660 | $6,992 | $28,642 | $3,324 | $2,224 | $108,877 | $9,073 |
| Skate | $46,139 | $16,181 | $19,791 | $19,582 | $34,594 | $10,550 | $16,503 | $8,390 | $4,142 | $11,692 | $3,427 | $3,693 | $194,685 | $16,224 |
| Summer Flounder, Scup, Black Sea Bass | $27,937 | $4,045 | $12,543 | $13,602 | $27,487 | $32,310 | $62,906 | $49,273 | $95,594 | $96,519 | $74,597 | $63,547 | $560,360 | $46,697 |
| Surf Clam/Ocean Quahog | $327,689 | $283,269 | $306,663 | $147,807 | $49,682 | $6,111 | $20,155 | $8,738 | $17,278 | $112,401 | $11,222 | $40,192 | $1,331,207 | $110,934 |
| None–Unmanaged | $15,441 | $26,504 | $23,048 | $26,110 | $20,744 | $20,214 | $32,230 | $35,094 | $33,284 | $23,965 | $24,104 | $25,953 | $306,691 | $25,558 |
| All Other | $81,215 | $11,047 | $7,756 | $35,880 | $7,430 | $7,097 | $49,817 | $40,475 | $20,250 | $7,036 | $6,376 | $10,264 | $284,643 | $23,720 |
| Total | $578,515 | $567,172 | $598,004 | $324,249 | $322,183 | $318,960 | $331,531 | $376,168 | $451,459 | $1,316,420 | $304,775 | $256,448 | $5,745,884 | $478,824 |

Source: Geret DePiper, Pers. Comm., August 2018

FMP = Fisheries Management Plan
Revenue was converted to 2019 dollars using the monthly, not seasonally, adjusted Producer Price Index by Industry for Fresh and Frozen Seafood Processing provided by the U.S. Bureau of Labor Statistics. American lobster and Jonah crab fisheries are included in the "None–Unmanaged" row.

**Table B.1-12: Value of Landings by Wind Development Area Fisheries Management Plan as a Percentage of Total Coast-wide Fisheries Management Plan, 2007–2018**

| FMP | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mackerel, Squid, Butterfish | 0.02% | 0.35% | 0.31% | 0.10% | 0.26% | 0.36% | 0.29% | 0.52% | 0.62% | 1.61% | 0.24% | 0.14% |
| Monkfish | 0.09% | 0.02% | 0.03% | 0.11% | 0.16% | 0.22% | 0.10% | 0.07% | 0.06% | 0.11% | 0.05% | 0.05% |
| Northeast Multispecies–Small Mesh | 0.27% | 0.42% | 0.72% | 0.18% | 0.25% | 0.24% | 0.35% | 0.24% | 0.26% | 0.33% | 0.51% | 0.20% |
| Sea Scallop | 0.00% | 0.01% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% | 0.00% | 0.00% |
| Skate | 0.44% | 0.20% | 0.27% | 0.23% | 0.44% | 0.14% | 0.13% | 0.08% | 0.06% | 0.18% | 0.06% | 0.05% |
| Summer Flounder, Scup, Black Sea Bass | 0.07% | 0.01% | 0.04% | 0.04% | 0.07% | 0.09% | 0.16% | 0.13% | 0.24% | 0.24% | 0.20% | 0.18% |
| Surf Clam/Ocean Quahog | 0.39% | 0.38% | 0.44% | 0.23% | 0.08% | 0.01% | 0.04% | 0.02% | 0.03% | 0.19% | 0.02% | 0.07% |

Source: Geret DePiper, Pers. Comm., August 2018

FMP = Fisheries Management Plan; WDA = Wind Development Area; VTR = vessel trip report
Table B.1-11 shows the value of landings for the WDA by the FMP; Table B.1-12 shows the percentage of each FMP's revenue from landings within the WDA compared to each FMP's total revenue from landings in the entire region covered by the FMP. The data represent the revenue-intensity raster developed using fishery dependent landings' data. To produce the data set, VTR information was merged with data collected by at-sea fisheries observers, and a cumulative distribution function was estimated to present the distance between VTR points and observed haul locations. This provided a spatial footprint of fishing activities by FMPs.

**Table B.1-13: Value of Landings by Species for the Wind Development Area (Vessel Trip Report, 2019 Dollars), 2008–2017**

| **Species** | **2008** | **2009** | **2010** | **2011** | **2012** | **2013** | **2014** | **2015** | **2016** | **2017** | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Black sea bass | | | | | $1,001 | $1,747 | | $1,307 | $795 | $5,406 | $10,257 |
| Bluefish | $314 | | $667 | $2,920 | $547 | $162 | $637 | $855 | $276 | $1,000 | $7,378 |
| Butterfish | $1,754 | $1,420 | $1,739 | $2,004 | | $8,166 | $2,912 | $2,170 | $3,711 | $5,795 | $29,673 |
| Crab, Jonah | $645 | | $2,996 | $8,205 | $31,405 | $92,197 | | | | | $135,448 |
| Crab, rock | | | | $5,124 | | | | | | | $5,124 |
| Dogfish, smooth, fins | | | | | | | | | | $2,122 | $2,122 |
| Dogfish, spiny, fins | | | | | | | | | | $287 | $287 |
| Eel, conger | | | | | | | | | | $9 | $9 |
| Flounders | $10,917 | | | $9,112 | | $75,535 | $33,636 | $62,155 | $6,571 | $32,286 | $230,212 |
| Hakes | $68,210 | $15,631 | $95,466 | $37,024 | | $147,956 | $39,432 | $40,828 | $46,560 | $61,734 | $552,841 |
| Lobster, American | $35,456 | $30,539 | $26,600 | $89,701 | $49,682 | $29,094 | $5,345 | | $25,915 | $2,897 | $295,229 |
| Mackerel, Atlantic | | | | | | | | | $13 | | $13 |
| Monkfish | $10,100 | $2,587 | $36,213 | $61,199 | $147,521 | $48,449 | $43,175 | $16,387 | $32,073 | $31,474 | $429,179 |
| Scallops/shells | $545 | | | | | $118,081 | $4,542 | | $1,666 | | $124,834 |
| Scup | | | $11,954 | $34,878 | | $17,454 | | $53,685 | $4,502 | $80,630 | $203,103 |
| Skate, rack | $8,547 | $12,904 | $17,926 | $20,266 | $58,747 | $44,949 | $39,410 | $27,723 | $32,805 | $11,627 | $274,905 |
| Squids | $31,252 | $7,535 | $9,613 | $4,925 | | $79,560 | $38,805 | $45,661 | $526,582 | $7,795 | $751,728 |
| All others | $8,800 | $19,904 | $120,677 | $8,219 | $24,153 | $3,754 | $67,989 | $60,905 | $3,567 | $1,402 | $319,370 |
| Total | $176,542 | $90,521 | $323,851 | $283,578 | $313,056 | $667,105 | $275,883 | $311,678 | $685,036 | $244,464 | $3,371,714 |

Source: Benjamin Galuardi, Pers. Comm., April 3, 2019

Empty cells indicate that data were not collected or not available.

**Table B.1-14: Volume of Landings by Species for the Wind Development Area (Vessel Trip Report, Landed Pounds), 2008–2017**

| Species | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Black sea bass | | | | | 218 | 335 | | 357 | 149 | 1,319 | 2,378 |
| Bluefish | 664 | | 1,149 | 3,899 | 786 | 195 | 891 | 863 | 318 | 1,020 | 9,785 |
| Butterfish | 1,944 | 2,855 | 1,944 | 2,043 | | 15,830 | 3,100 | 3,242 | 9,564 | 9,426 | 49,948 |
| Crab, Jonah | 994 | | 5,155 | 10,341 | 36,458 | 105,190 | | | | | 158,138 |
| Crab, rock | | | | 8,301 | | | | | | | 8,301 |
| Dogfish, smooth, fins | | | | | | | | | | 3,507 | 3,507 |
| Dogfish, spiny, fins | | | | | | | | | | 1,099 | 1,099 |
| Eel, conger | | | | | | | | | | 10 | 10 |
| Flounders | 4,099 | | | 3,317 | | 33,274 | 8,645 | 23,471 | 1,286 | 7,770 | 81,861 |
| Hakes | 93,784 | 41,015 | 90,708 | 53,819 | | 189,158 | 54,456 | 66,232 | 98,906 | 107,786 | 795,863 |
| Lobster, American | 7,899 | 7,301 | 5,857 | 21,023 | 12,739 | 6,320 | 1,012 | | 4,544 | 530 | 67,225 |
| Mackerel, Atlantic | | | | | | | | | 35 | | 35 |
| Monkfish | 4,501 | 1,314 | 22,487 | 28,504 | 70,787 | 35,890 | 30,622 | 10,151 | 20,735 | 22,122 | 247,112 |
| Scallops/shells | 62 | | | | | 10,241 | 353 | | 144 | | 10,800 |
| Scup | | | 22,276 | 69,464 | | 27,348 | | 58,626 | 5,053 | 120,684 | 303,451 |
| Skate, rack | 60,160 | 35,210 | 30,287 | 34,339 | 88,488 | 51,991 | 46,248 | 43,033 | 66,971 | 32,623 | 489,349 |
| Squids | 28,186 | 5,940 | 7,075 | 3,277 | | 67,388 | 34,440 | 37,488 | 405,651 | 3,878 | 593,323 |
| All others | 8,830 | 15,629 | 18,254 | 8,003 | 51,526 | 10,331 | 65,270 | 5,463 | 2,984 | 967 | 187,257 |
| Total | 211,123 | 109,264 | 205,192 | 246,330 | 261,002 | 553,491 | 245,038 | 248,926 | 616,338 | 312,740 | 3,009,443 |

Source: Benjamin Galuardi, Pers. Comm., April 3, 2019

Empty cells indicate that data were not collected or not available. Values are reported in landed pounds.

**Table B.1-15: Value of Landings by Gear Type for the Wind Development Area (Vessel Trip Report, 2019 Dollars), 2008–2017**

| Gear Type | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gillnet-sink | | | | $78,873 | | $85,447 | | $39,135 | | $37,394 | $240,849 |
| Pot | | $31,507 | $32,495 | $102,699 | $85,362 | $123,203 | | | $27,124 | | $402,390 |
| Trawl-bottom | $132,630 | $46,213 | $129,383 | $99,829 | | $341,190 | $178,591 | $211,315 | $595,795 | $203,909 | $1,938,854 |
| All others | $43,912 | $12,800 | $161,972 | $2,176 | $227,696 | $117,268 | $97,290 | $61,228 | $62,120 | $3,160 | $789,623 |
| Total | $176,542 | $90,520 | $323,850 | $283,576 | $313,058 | $667,109 | $275,881 | $311,677 | $685,039 | $244,463 | $3,371,715 |

Source: Benjamin Galuardi, Pers. Comm., April 3, 2019

Empty cells indicate that data were not collected or not available.

**Table B.1-16: Volume of Landings by Gear Type for the Wind Development Area (Vessel Trip Report, Landed Pounds), 2008–2017**

| Gear Type | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gillnet-sink | | | | 68,048 | | 86,257 | | 48,931 | | 44,444 | 247,680 |
| Pot | | 8,852 | 18,358 | 39,792 | 54,476 | 114,160 | | | 6,244 | | 241,882 |
| Trawl-bottom | 194,035 | 86,126 | 124,107 | 137,741 | | 343,217 | 157,024 | 195,226 | 523,556 | 267,443 | 2,028,474 |
| All others | 17,088 | 14,286 | 62,727 | 749 | 206,526 | 9,857 | 88,014 | 4,769 | 86,539 | 853 | 491,408 |
| Total | 211,123 | 109,264 | 205,192 | 246,330 | 261,002 | 553,491 | 245,038 | 248,926 | 616,339 | 312,740 | 3,009,443 |

Source: Benjamin Galuardi, Pers. Comm., April 3, 2019

Empty cells indicate that data were not collected or not available. Values are reported in landed pounds.

**Table B.1-17: Value of Landings by Port for the Wind Development Area (Vessel Trip Report, 2019 Dollars), 2008–2017**

| Port | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Montauk | | | | | | | | | | $40,629 | $40,629 |
| New Bedford | | $46,151 | $179,883 | $66,084 | $13,553 | | $20,164 | | $100,867 | | $426,702 |
| Point Judith | $116,149 | | $58,605 | $83,392 | | $286,689 | $160,234 | $242,957 | $452,756 | $119,803 | $1,520,587 |
| Point Pleasant | | | | | | | | | | $26,108 | $26,108 |
| Westport | | | | $60,428 | | | | | | | $60,428 |
| All others | $60,393 | $44,369 | $85,361 | $73,674 | $299,505 | $380,418 | $95,483 | $68,720 | $131,416 | $57,922 | $1,297,260 |
| Total | $176,542 | $90,520 | $323,849 | $283,578 | $313,058 | $667,108 | $275,881 | $311,677 | $685,039 | $244,462 | $3,371,713 |

Source: Benjamin Galuardi, Pers. Comm., April 3, 2019

Empty cells indicate that data were not collected or not available.

**Table B.1-18: Volume of Landings by Port for the Wind Development Area (Vessel Trip Report, Landed Pounds), 2008–2017**

| Port | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Montauk | | | | | | | | | | 56,022 | 56,022 |
| New Bedford | | 27,226 | 58,609 | 35,007 | 10,286 | | 17,638 | | 97,357 | | 246,123 |
| Point Judith | 137,296 | | 68,664 | 121,160 | | 208,264 | 140,186 | 186,758 | 378,589 | 187,326 | 1,428,241 |
| Point Pleasant | | | | | | | | | | 10,975 | 10,975 |
| Westport | | | | 30,113 | | | | | | | 30,113 |
| All others | 73,827 | 82,038 | 77,919 | 60,050 | 250,716 | 345,227 | 87,214 | 62,168 | 140,393 | 58,417 | 1,237,969 |
| Total | 211,123 | 109,264 | 205,192 | 246,330 | 261,002 | 553,491 | 245,038 | 248,926 | 616,339 | 312,740 | 3,009,443 |

Source: Benjamin Galuardi, Pers. Comm., April 3, 2019

Empty cells indicate that data were not collected or not available. Values are reported in landed pounds.

**Table B.1-19: Value of Landings by State for the Wind Development Area (Vessel Trip Report, 2019 Dollars), 2008–2017**

| State | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Connecticut | | | | | | | | | $44,948 | | $44,948 |
| Massachusetts | | $49,364 | $241,696 | $181,889 | $210,955 | $130,524 | $101,223 | $53,757 | $182,414 | $41,400 | $1,193,221 |
| New Jersey | | | | | | | | | | $26,108 | $26,108 |
| New York | | | | | | | | | | $43,784 | $43,784 |
| Rhode Island | $132,736 | $40,751 | $58,605 | $83,392 | $94,914 | $383,233 | $167,113 | $242,957 | $457,322 | $122,733 | $1,783,758 |
| All others | $43,806 | $405 | $23,548 | $18,295 | $7,187 | $153,352 | $7,545 | $14,963 | $354 | $10,438 | $279,892 |
| Total | $176,542 | $90,520 | $323,849 | $283,576 | $313,057 | $667,109 | $275,881 | $311,677 | $685,038 | $244,462 | $3,371,711 |

Source: Benjamin Galuardi, Pers. Comm., April 3, 2019

Empty cells indicate that data were not collected or not available.

**Table B.1-20: Volume of Landings by State for the Wind Development Area (Vessel Trip Report, Landed Pounds), 2008–2017**

| State | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Connecticut | | | | | | | | | 50,935 | | 50,935 |
| Massachusetts | | 33,979 | 119,758 | 108,050 | 161,338 | 121,793 | 94,743 | 55,763 | 179,187 | 47,982 | 922,593 |
| New Jersey | | | | | | | | | | 10,975 | 10,975 |
| New York | | | | | | | | | | 57,619 | 57,619 |
| Rhode Island | 176,776 | 75,216 | 68,664 | 121,160 | 97,583 | 310,638 | 145,876 | 186,758 | 386,160 | 192,486 | 1,761,315 |
| All others | 34,347 | 69 | 16,770 | 17,120 | 2,081 | 121,060 | 4,419 | 6,405 | 57 | 3,678 | 206,006 |
| Total | 211,123 | 109,264 | 205,192 | 246,330 | 261,002 | 553,491 | 245,038 | 248,926 | 616,339 | 312,740 | 3,009,443 |

Source: Benjamin Galuardi, Pers. Comm., April 3, 2019

Empty cells indicate that data were not collected or not available. Values are reported in landed pounds.

Analysis prepared by the RI DEM for the WDA, using VMS and VTR data, provides an estimate of the ex-vessel value (the price received at port of landing) of the Rhode Island commercial fishing industry that is derived from the WDA (RI DEM 2019). The study suggests that the value of fishing in the area is $35.6 million for a 30-year period (corresponding to the length of the lease and construction time). The values are premised on existing trips that either fully or partially intersect the WDA area, including a 2-nautical-mile (2.3-mile) section north or south of the WDA. The study further showed that almost $21 million of the total 30-year value would be from the Atlantic Mackerel, Squid, and Butterfish FMP; $4.7 million from the Northeast Multispecies FMP, small mesh species (hakes); $4.6 million from Summer Flounder, Scup, and Black Sea Bass FMP; $2.2 million from groundfish, $1.5 million from American lobster; $1 million from scallops; and the remaining from other species. Again, the RI DEM (2019) analysis was specific to vessels landing in Rhode Island ports.

The Summer Flounder, Scup, Black Sea Bass FMP landed up to 0.2 percent of the total coast-wide revenue (Table B.1-12). Between 2007 and 2018, annual revenue from landings of summer flounder (*Paralichthys dentatus*), scup (*Stenotomus chrysops)*, and black sea bass (*Centropristis striata*) in the WDA ranged from $4,045 to $96,519, with a total revenue of $560,360 for 2007 to 2018 (2019 dollars, Table B.1-11). Summer flounder is most often landed from January to September, with the peak in June through August. Three periods comprise the scup's quota. In spring and summer, scup migrate to northern and inshore waters to spawn. The black sea bass peak harvest is typically June through September.

Many potentially affected fisheries, including the whiting, summer flounder, scup, and black sea bass, are not required to use VMS. Therefore, these fisheries are underrepresented in evaluations of impacts from the WDA or the cable corridor. Data from several sources are provided in this section to show how the estimates of catch from the WDA may differ depending on the measurement method.

Data provided by NOAA NEFSC (Table B.1-13 and Table B.1-14) that were collected through VTRs show low revenue from the WDA for black sea bass ($10,257 for 2008 through 2017). Revenues for scup total $203,103, and revenues for flounders total $230,212 between 2008 and 2017 (2019 dollars).

The Atlantic Mackerel, Squid, Butterfish FMP covers longfin and illex squid, which make up the majority species landed in this FMP. Bottom and mid-water trawling account for most landings (ASMFC 2018b). As shown on Figure B.1-8, density was variable in vessels targeting squid throughout the WDA with patches of medium-low to medium-high density, and an area of very high density along the OECC. Revenue from the Atlantic Mackerel, Squid, and Butterfish FMP from the WDA ranged from a low of $11,390 in 2007 to a high of $978,455 in 2016 (Table B.1-11). For 2007 to 2018, the total revenue for this FMP was $2.3 million (Table B.1-11). Based on VMS data and the RI DEM analysis, 2016 was also a high revenue year ($5.1 million for the entire lease area around the WDA [Table B.1-9]) but with higher activity densities also seen north of the WDA.

To the contrary, Table B.1-8 shows no revenue from Atlantic mackerel (*Scomber scombrus)* from the WDA ($13 for 2008 to 2017), $751,728 in revenue from squids, and $29,673 from butterfish. For the period of 2008 to 2017, the squid fishing revenue from Rhode Island is estimated at $192.1 million with 235.1 million pounds landed. In general, squid landings in Rhode Island represented 53 percent of total squid landings from the Atlantic and 54 percent of total squid revenue from the Atlantic (based on nominal revenue data for 2008 to 2017; NOAA 2019f). With $643,551 in squid revenue from the WDA from 2008 to 2017, the WDA accounts for 0.18 percent of squid revenue from the Atlantic (or 0.33 percent of squid revenue from Rhode Island).

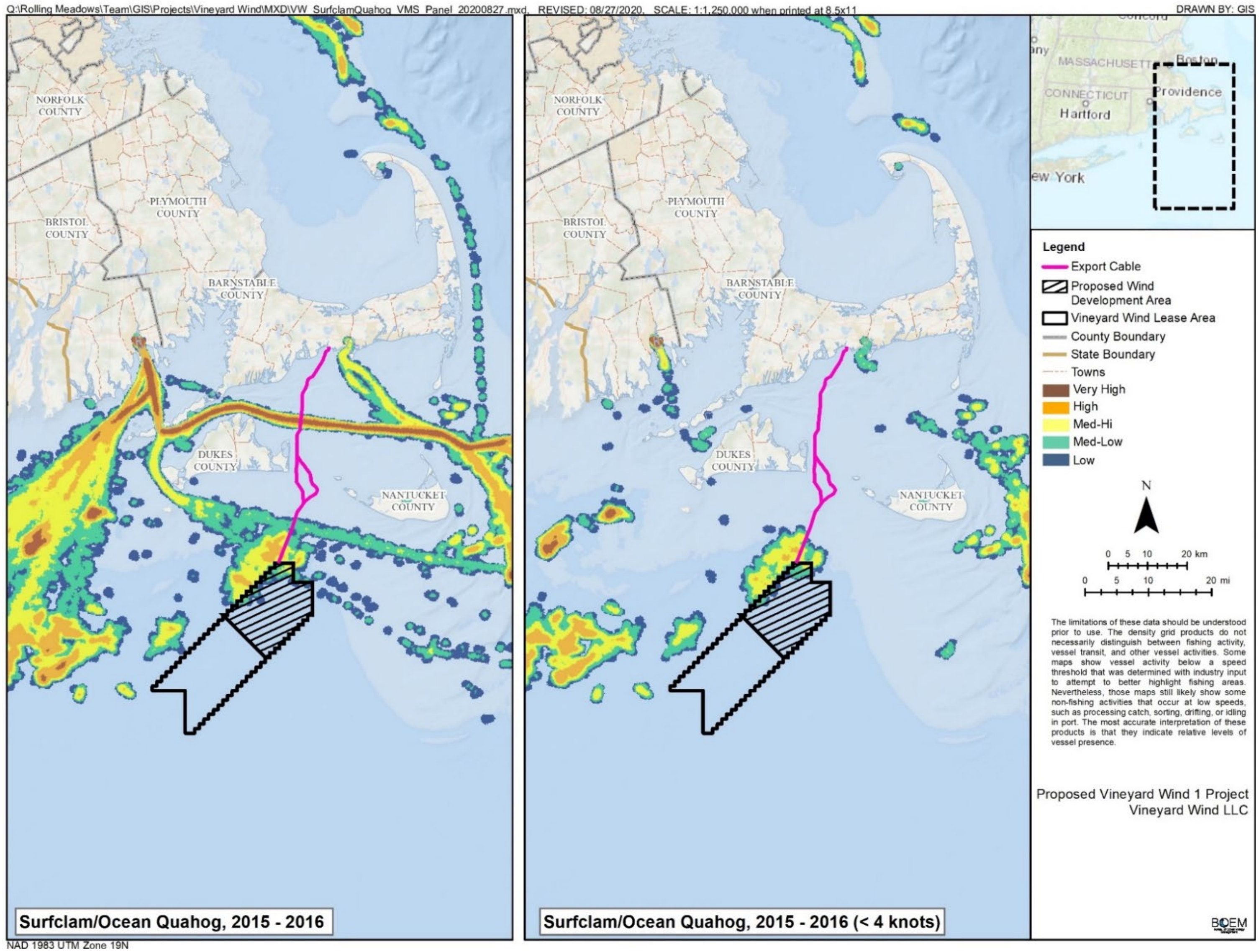
As shown on Figure B.1-12, VMS data indicate that surf clam/ocean quahog fishing vessels are not typically found within the WDA; however, along the OECC, there were areas where very high density of catch were indicated. Figure B.1-12 shows the relative surf clam/ocean quahog fishing vessel density during the year 2015 to 2016, with all recorded fishing vessels traveling at any speed, and speed filtered to show only those vessels traveling less than 4 knots. VMS data show vessel presence but do not indicate whether the vessel is fishing or not. The presence of vessels traveling less than 4 knots may better indicate surf clam/ocean quahog fishing activity because higher-speed vessels are more likely to be transiting. Figure B.1-13 shows a majority of the 24 unique vessels in the surf clam and ocean quahog fishery transiting in a northeast to southwest direction through the southern New England lease areas. Surf clams are harvested principally via hydraulic dredging. The harvest of surf clam and ocean quahog in the WDA provided a high value of landings prior to 2011; however, since then, the harvest has substantially decreased in the WDA, valued at only $17,278 in 2015, increasing to $112,401 in 2016 and down to $11,222 in 2017. From 2007 to 2018, the total revenue for this FMP was $1.3 million from the WDA (Table B.1-11).

Atlantic sea scallop vessels had medium-low or medium-low to medium-high VMS density in the WDA and higher VMS density (up to high) along the OECC (Figure B.1-14). Figure B.1-15 shows the relative sea scallop fishing vessel density between 2015 and 2016, with all recorded fishing vessels traveling at any speed, and speed filtered to show only those vessels traveling less than 5 knots. VMS data show vessel presence but do not indicate whether the vessel is fishing or not. The presence of vessels traveling less than 5 knots may better indicate sea scallop fishing activity because higher-speed vessels are more likely to be transiting. Figure B.1-5 shows a majority of the 418 unique vessels in the sea scallop fishery transiting in a northwest to southeast direction through the southern New England lease areas. Dredges are the primary fishing gear. Table B.1-11 shows that the annual revenue for this FMP from the WDA ranged from $1,822 to $28,642, with $108,877 landed from 2007 to 2018. To compare, VTR data show $118,081 in revenue from sea scallops/shellfish from the WDA in 2013; less than $4,600 in 2008, 2014, and 2016; and no revenue in the remaining years (Table B.1-13).

VTR data inform that other important sources of revenue from the WDA from 2008 to 2017 were Jonah crab (totaling $135,448), hakes ($552,841), American lobster ($295,229), monkfish ($429,179), and skate ($274,905; Table B.1-13 and Table B.1-14).

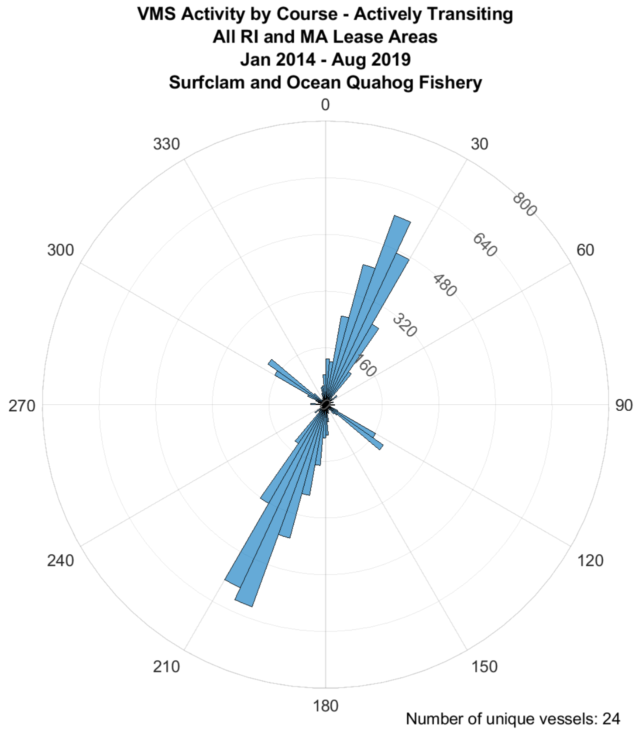
Table B.1-15 and Table B.1-16 show the value and volume of landings for the WDA from 2008 to 2017. Bottom trawl is the primary gear type used in the WDA, where an estimated 57 percent of all revenue from the WDA and more than 65 percent of landed fish was caught using bottom trawl. Bottom trawl targets bluefish *(Pomatomus salatrix)*, monkfish, summer flounder, winter flounder (*Pseudopleuronectes americanus*), silver hake (*Merluccius bilinearis*), whiting, spiny dogfish (*Squalus acanthias*), smooth dogfish (*Mustelus canis*), scup, and black sea bass. The nearshore bottom-trawl fishery targets butterfish, bluefish, and other finfish species; the deeper water fisheries target bluefish, Atlantic mackerel, Loligo squid, black sea bass, and scup (NOAA 2019h). Other deployed gear types in the WDA include pot and sink gillnet. Pot targets crabs, lobsters, scup, and black sea bass. Sink gillnet targets species such as yellowtail flounder (*Limanda ferruginea),* winter flounder, witch flounder (*Glyptocephalus cynoglossus*), windowpane flounder (*Scophthalmus aquosus*), spiny dogfish, monkfish, silver hake, red hake (*Urophycis chuss*), white hake (*Urophycis tenuis*), skate, mackerel, and other.

Commercial fishing vessels homeported in Point Judith fish in the WDA most intensively. From 2008 to 2017, Point Judith fishing revenue from the WDA is estimated at $1.5 million with 1.4 million pounds of catch landed in the port (Table B.1-17 and Table B.1-18). Most of Point Judith fishing revenue is from squid, lobster, summer flounder, Atlantic sea scallop, scup, monkfish, silver hake, Jonah crab, and yellowtail flounder sales (NMFS 2018a). In fact, 53 percent of fishing revenue from the WDA is landed in Rhode Island, with 35 percent landed in Massachusetts, and the remaining landed in other states (Table B.1-19).



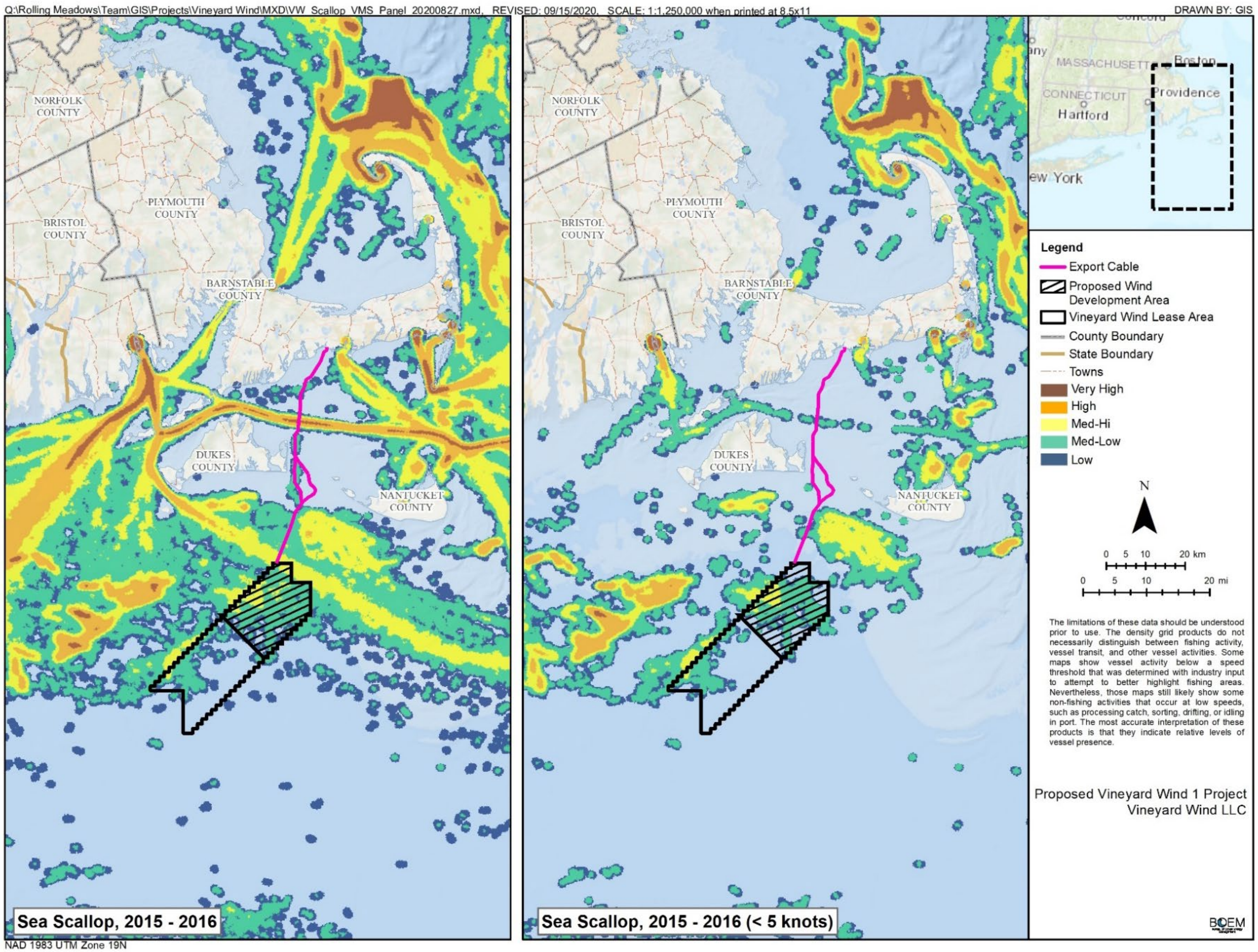

Source: Northeast Regional Ocean Council 2020

**Figure B.1-12: Surf Clam/Ocean Quahog Fishing Vessel Density Based on Vessel Monitoring System Data (2015-2016)**



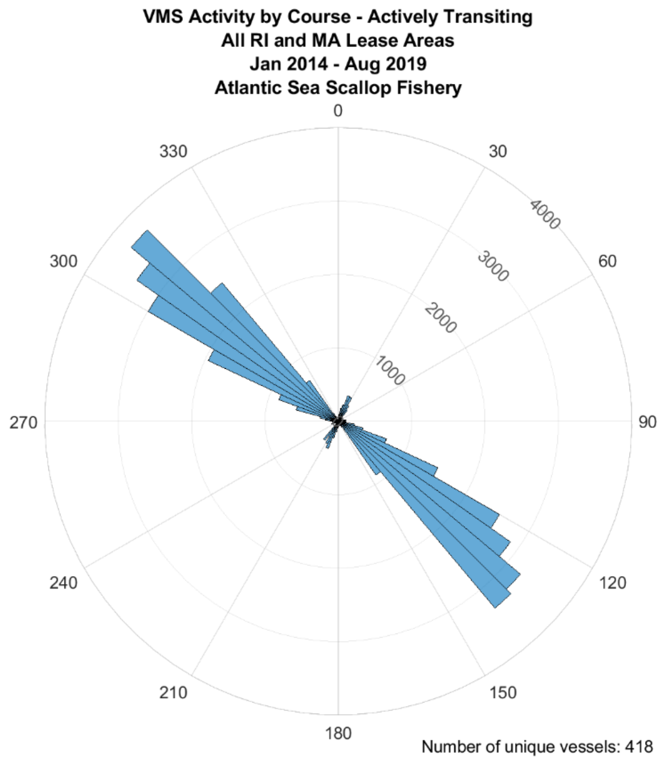

MA = Massachusetts; RI= Rhode Island; VMS = vessel monitoring system

**Figure B.1-13: Surf Clam and Ocean Quahog Fishery in Rhode Island/Massachusetts Lease Areas—Transiting**




Source: Northeast Regional Ocean Council 2020

**Figure B.1-14: Sea Scallop Fishing Vessel Density Based on Vessel Monitoring System Data (2015–2016)**




MA = Massachusetts; RI= Rhode Island; VMS = vessel monitoring system

**Figure B.1-15: Sea Scallop Fishery in Rhode Island/Massachusetts Lease Areas—Transiting**

It is more challenging to quantitatively characterize fishing along the OECC because it is a linear feature. In addition, fewer impacts are expected along the OECC due to the relatively narrow area potentially disturbed. As shown on Figures B.1-8, B.1-11, and B.1-14, the OECC intersects areas with high vessel density for fishermen targeting squid, surf clams/ocean quahogs, and Atlantic sea scallops. In addition, as shown on Figure B.1-16, part of the OECC within state waters intersects an area of "high commercial fishing effort and value" identified in the Massachusetts Ocean Management Plan (EEA 2015). There is also low, medium-low to medium-high vessel density along the OECC, whereas vessel density in the WDA is characterized as low (Figures B.1-17 and B.1-18).

The Massachusetts Division of Marine Fisheries Draft Environmental Impact Report indicates that the OECC would pass through areas of commercial and recreational fishing and habitat for a variety of invertebrate and finfish species, including channeled whelk (*Busycotypus canaliculatus*), knobbed whelk (*Busycon carica*), longfin squid (*Doryteuthis pealeii*), summer flounder, windowpane flounder, scup, surf clam, Atlantic sea scallop, quahog, Atlantic horseshoe crabs (*Limulus polyphemus*), and blue mussel (*Mytilus edulis*) (Epsilon 2018).

Blue mussel and kelp aquaculture operations are also located within Horseshoe Shoals (a subtidal area of Nantucket Sound) (Epsilon 2018). Existing aquaculture operations lie near the southern portion of Horseshoe Shoals, near the main channel of Nantucket Sound. However, this is more than 4 nautical miles (4.6 miles) from the OECC. The proposed Project is not anticipated to affect leased aquaculture sites.

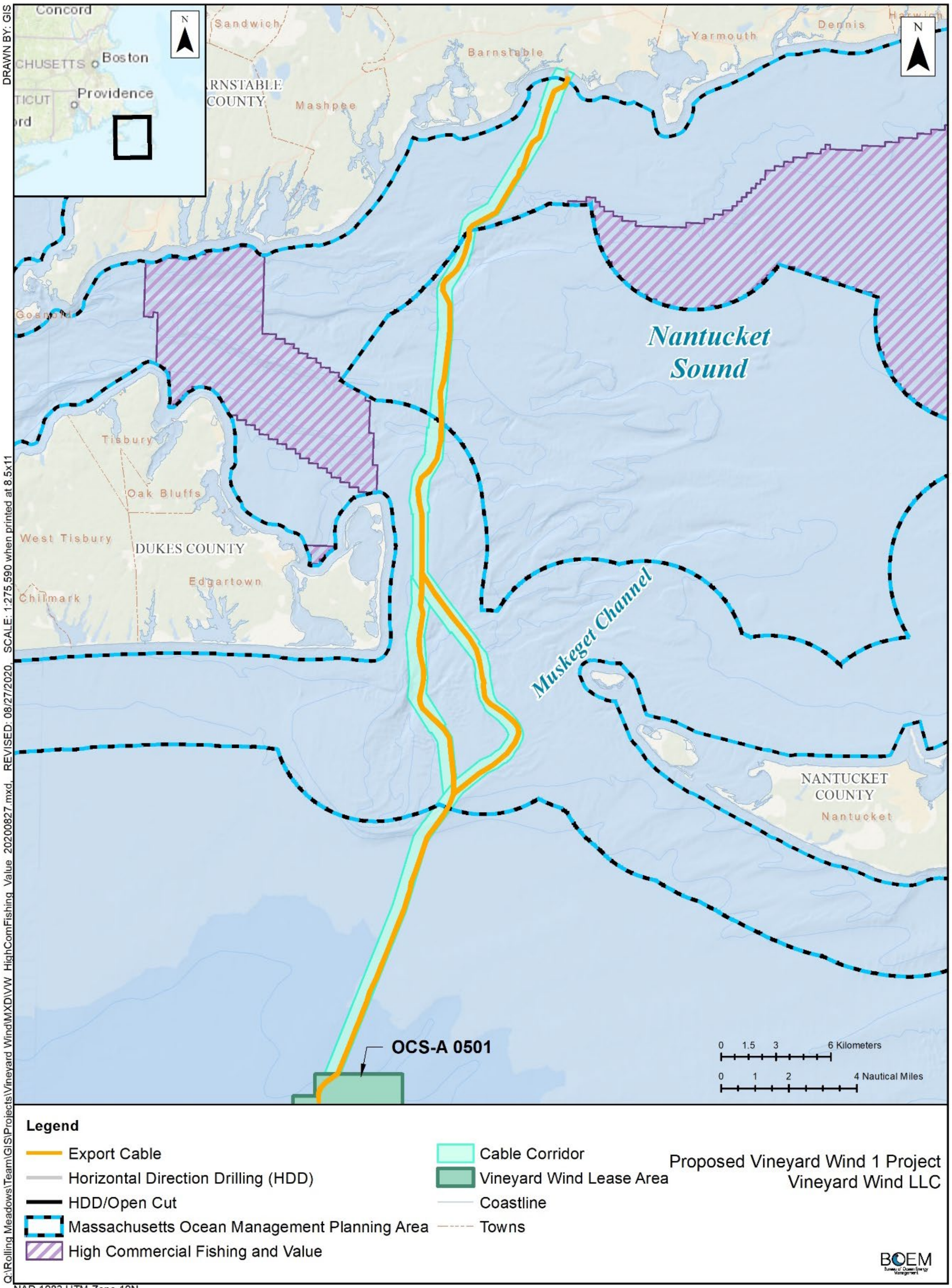
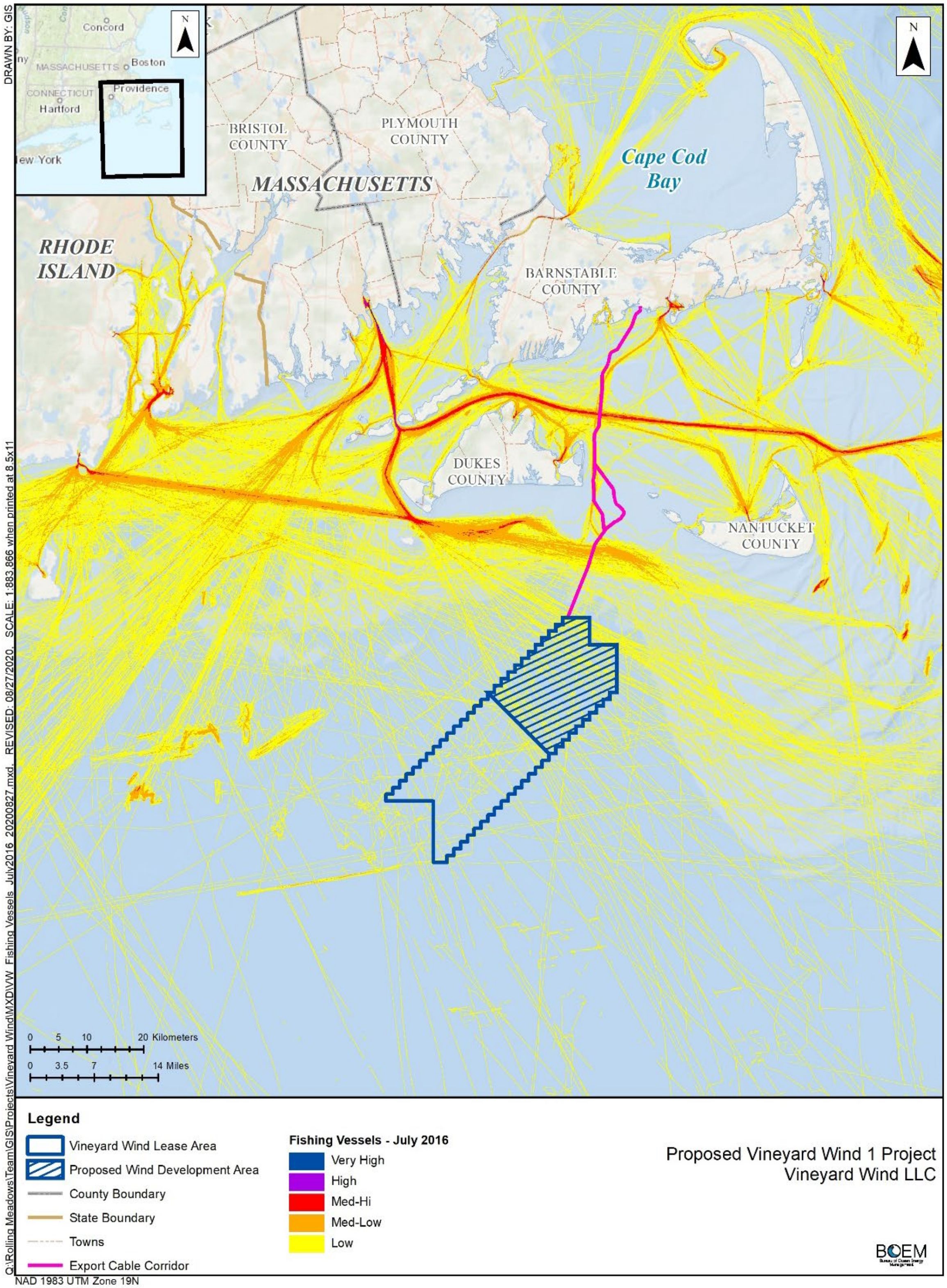
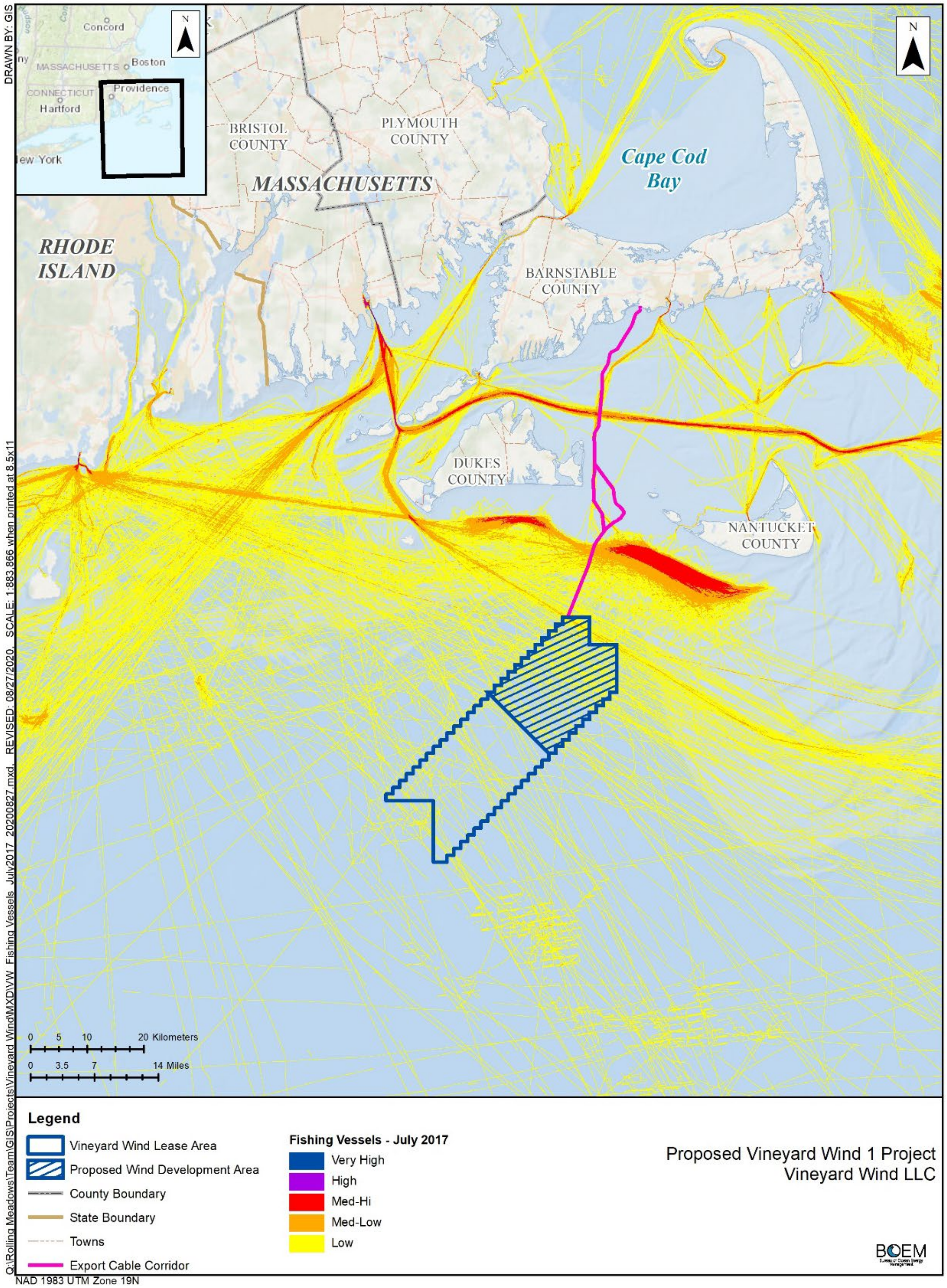



**Figure B.1-16: Massachusetts Ocean Management Plan Areas of High Commercial Fishing Effort and Value**




Source: Northeast Regional Ocean Council 2020

**Figure B.1-17: Fishing Monthly Vessel Transit Counts from July 2016 Automatic Identification System Northeast and Mid-Atlantic**




Source: Northeast Regional Ocean Council 2020

**Figure B.1-18: Fishing Monthly Vessel Transit Counts from July 2017 Automatic Identification System Northeast and Mid-Atlantic**

Fishing for whelk, often referred to locally as conch, is done from Horseshoe Shoals and other areas in Nantucket Sound. This fishery was valued at $4.8 million in 2016. Although this is a relatively new fishery that was not heavily exploited until the early 2010s, signs indicate that the stocks are vulnerable to overfishing and may already be overfished. This fishery operates entirely within state waters, with a plurality of the total catch taken from Nantucket Sound (Nelson et al. 2018). Again, because of the distance from the OECC, proposed Project activities are not expected to affect this fishery.

The lobster fishery in Massachusetts is the most lucrative fishery harvested within the state's waters, but it is now in a depleted condition (Dean 2010; MA DMF 2017). Despite the reduced landings (17.6 million pounds in 2016), rising prices bolster the fishery's value, which was more than $82 million in 2017 (MA DMF 2017). Recently, there has been very little lobster catch from nearshore waters south of Cape Cod; therefore, most vessels from this area now venture far offshore to target lobster in deeper waters (Abel 2017; Dean 2010; MA DMF 2017).

Atlantic horseshoe crab spawning areas are associated with Covell's Beach and Great Island Beach (Epsilon 2018). This fishery, while significant to the state, is patchy and variable from year-to-year. Most of the catch comes from Cape Cod Bay, Nantucket Sound, and near the islands of Nantucket and Martha's Vineyard (Burns 2018; Perry 2017). Surf clam habitat and patchy eelgrass beds also occur in waters offshore of Covell's Beach. For-hire recreational fishing is also an important economic sector regionally with peak activity June through August (NOAA 2017b). Regionally in 2015, the industry created 2,232 jobs, generated $326 million in sales, and contributed $192 million in value added. The Marine Recreational Information Program data show that mackerels, cod, and striped bass (*Morone saxatilis*) were the most-caught species within the Massachusetts for-hire recreational fishery. Black sea bass, scup, striped bass, summer flounder, and tautog (*Tautoga onitis*) were the most-caught species within the Rhode Island for-hire recreational fishery (NOAA 2017c).

In 2018, there were 129,862 party- and charter-boat fishing trips out of Massachusetts and 42,558 out of Rhode Island. However, there is substantial variability year-to-year with as few as 95,000 trips in 2016 and as many as 224,249 trips in 2017 from Massachusetts. Based on the number of trips over the past 10 years, there are, on average, 188,916 party- and charter boat fishing trips per year out of Massachusetts and 45,648 out of Rhode Island (NOAA 2020b). On average, party and charter boats account for 5 percent of all recreational effort onboard boats off the coast of Massachusetts and 4 percent off the coast of Rhode Island based on the Fishery Effort Survey (NOAA 2020b). NOAA estimated that 97 percent of the 2011 recreational effort from Massachusetts occurred within 3 nautical miles (3.5 miles) of shore (BOEM 2012).

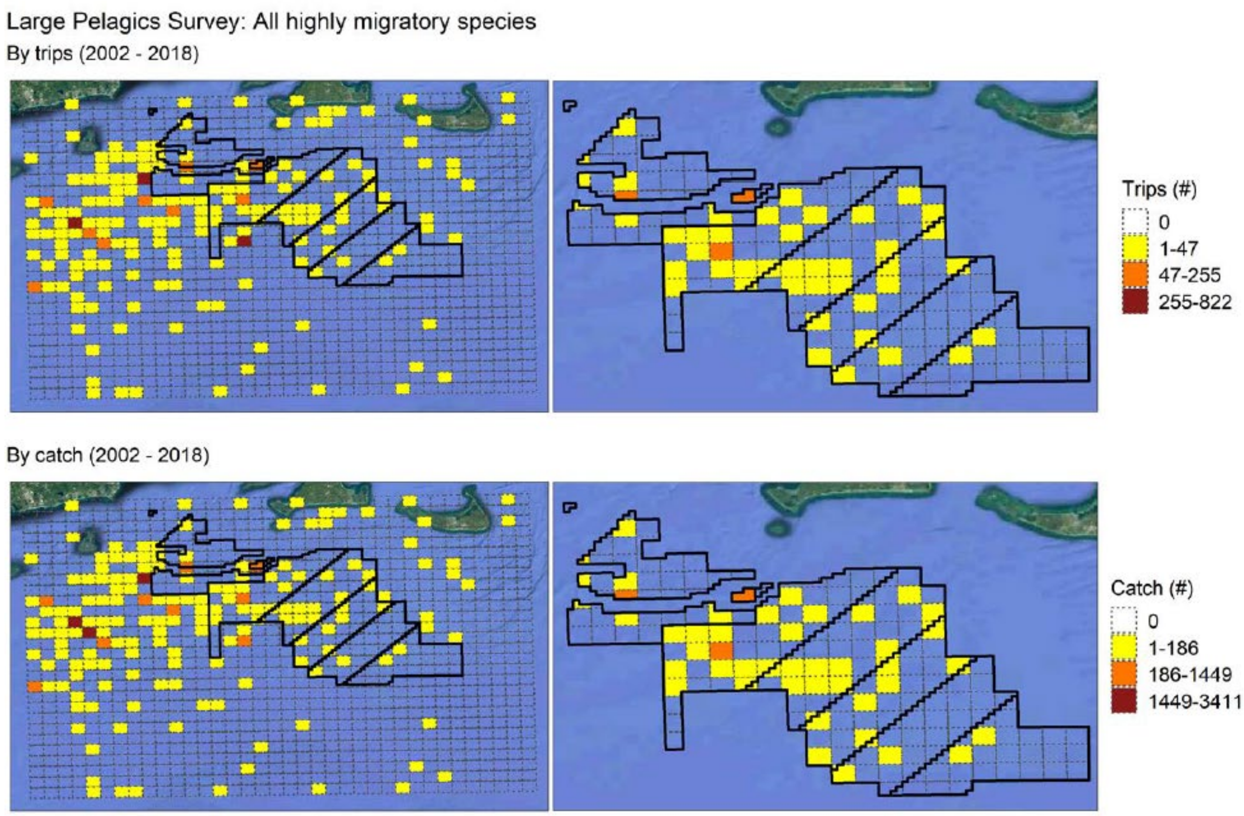
For-hire recreational fishing in the Atlantic provides opportunities for recreational fishing of highly migratory species such as tuna, billfish, swordfish (*Xiphias gladius*), and sharks. Tuna and sharks are found in the WDA where they feed on squid, mackerel, and butterfish found in the area. Tuna and sharks are targeted in the WDA by for-hire fishing boats. Highly migratory species such as tuna and shark are relatively costly to pursue for private anglers, as they require large vessels.

Popular recreational fishing areas across the RI/MA Lease Areas include "The Dump," where recreational vessels harvest Atlantic yellowfin tuna (*Thunnus albacares*), albacore tuna (*Thunnus alalunga*), and mahi-mahi (*Coryphaena hippurus*). Other nearby recreational fishing locations include "The Owl" and the "The Star." "Gordon's Gully" is the only named recreational fishing location within the WDA. "31 Fathom Hole" and the northeast corner of the Dump are wholly and partially in the New England Wind lease area (Figure 3.9-2 in EIS Section 3.9). Species caught by recreational vessels in these areas include bluefin tuna (*Thunnus thynnus)*, shortfin mako shark (*Isurus oxyrinchus*), common thresher sharks (*Alopias vulpinus)*, white marlin (*Kajikia albida*), and Atlantic yellowfin tuna. Along the OECC, harvested species often include striped bass, bluefish, bonito, false albacore (*Euthynnus alletteratus*), and bluefin tuna, as well as summer flounder, black sea bass, and scup (Epsilon 2020). In general, for-hire recreational fishing boats from the Massachusetts area most often catch cod, hake, striped bass, and mackerel (Epsilon 2020).

Figure B.1-19 shows areas of high recreational fishing (both for-hire and private angler recreational fishing) effort (i.e., number of trips and total catch) for highly migratory species throughout the southern New England region from 2002 to 2018 (Kneebone and Capizzano 2020). Based on the interpolation of trips and catch as reported in the Large Pelagics Intercept Survey, generally, the greatest amount of recreational fishing effort for highly migratory species occurred west of the RI/MA Lease Areas in the waters south and east of Montauk Point and Block Island. Within the RI/MA Lease Areas, a large amount of fishing effort for all highly migratory species occurred in “The Dump,” “Coxes Ledge,” “The Fingers,” and “The Claw.” Fifty-eight members of the Rhode Island Party and Charter Boat Association stated that they fish in the WDA area, particularly Gordon’s Gully for tuna and shark. The Star, The Claw, and the Fingers (inside) are also in proximity. The members are worried that once the proposed Project is in place, shark and tuna would no longer be found there, which could be harmful for business. Tuna and sharks are found in the WDA because they feed on squid, mackerel, and butterfish. If those species are affected, tuna and shark may also leave the WDA. Finding alternative fishing spots could be challenging, as it is uncertain where the species may relocate.

The highest density of recreational vessels is reported within Nantucket Sound and within 1 nautical mile (1.15 mile) of the coastline (Epsilon 2020). Table B.1-21 shows the average annual number of for-hire recreational boat trips by port group based on federally reported VTRs that come within 1 nautical mile (1.15 mile) of the RI/MA Lease Areas. NOAA NEFSC found only about 0.2 percent of for-hire boat trips and 0.325 percent of for-hire boat trips from Massachusetts, New Hampshire, New York, and Rhode Island were near the Massachusetts Wind Energy Area (i.e., BOEM lease areas OCS-A 0500, OCS-A 0501, OCS-A 0520, OCS-A 0521, and OCS-A 0522) (Kirkpatrick et al. 2017). Also, on average, more for-hire recreational fishing trips to the RI/MA Lease Areas originate from Montauk, New York, than any other port or state.

There is substantial variability in the volume and value landed of various species fished within the WDA. For example, as stated in Table B.1-11, surf clam/ocean quahog harvested from within the WDA was valued at $6,111 to $327,689, depending on the year. Similarly, Atlantic Mackerel, Squid, and Butterfish FMP from within the WDA varied from $11,390 to $978,455 per year. In general, based on catch data for the last decade, the total annual revenue from landings within the WDA usually varied from about $300,000 to $600,000 but peaked in 2016 at a high of $1.3 million. Year-to-year variation in available catch and fishing effort, as well as quotas set for commercial and recreational fisheries to protect stocks and prevent overfishing, introduce significant fluctuations in how much is landed every year from within the WDA, the Massachusetts Wind Energy Area, and other locations. As a result, it is challenging to predict what the commercial fishing revenue from specific fishing areas, such as the RI/MA Lease Areas, would look like going forward. However, the activity and value of fisheries in recent years, as described in the previous sections, are expected to be indicative of future conditions and trends.




Source: Kneebone and Capizzano 2020

**Figure B.1-19: Recreational Fishing Effort for Highly Migratory Species over the Southern New England Grid (left) and Rhode Island/Massachusetts Lease Areas (right), 2002–2018**

**Table B.1-21: Average Annual For-Hire Recreational Trips Within 1 Mile of Rhode Island/Massachusetts Lease Areas, 2007–2012**

| Port Group | Exposed For-Hire Boat Trips |
|---|---|
| Barnstable, Massachusetts | 2 |
| Falmouth, Massachusetts | 1 |
| Nantucket, Massachusetts | 1 |
| Oak Bluffs, Massachusetts | 1 |
| Onset, Massachusetts | 1 |
| Tisbury, Massachusetts | ~0 |
| Montauk, New York | 16 |
| Narragansett, Rhode Island | 8 |
| South Kingstown, Rhode Island | 2 |
| Westerly, Rhode Island | 1 |

Source: Kirkpatrick et al. 2017

## B.3 Potential Impacts on Scientific Research and Surveys

The analysis in this section is reprinted from the Final EIS for the Vineyard Wind 1 Project (BOEM 2021) and reflects input from NOAA and other agencies that occurred as part of the Vineyard Wind 1 Project. While more recent data may be available, the Vineyard Wind 1 information remains valid to broadly characterize and support the analysis of the New England Wind Project's impacts on scientific research and surveys in EIS Section 3.14, Other Uses (National Security and Military Use, Aviation and Air Traffic, Offshore Cables and Pipelines, Radar Systems, Scientific Research and Surveys, and Marine Minerals).

Research activities may continue within the Vineyard Wind 1 WDA during construction, as permissible by survey operators and boat captains. Vineyard Wind 1 would impact survey operations by excluding certain areas within the WDA occupied by project components (e.g., WTG foundations, cable routes) from potential sampling and by impacting survey gear performance, efficiency, and availability. Agencies would need to expend resources to update scientific survey methodologies due to construction and operations of Vineyard Wind 1, as well as to evaluate these changes on stock assessments and fisheries management. NOAA's Office of Marine and Aviation Operations determined that the NOAA ship fleet will not operate in wind facilities with 1 nautical mile (1.15 mile) or less separation between turbine foundations.

The following provides NOAA's evaluation of the potential impacts on these survey operations based on likely foreseeable actions, including the WDA and all other existing federal lease areas from Maine to mid-North Carolina.

**Fish and shellfish research programs:** Randomized station selection methodologies that are employed by most of the shipboard scientific fish and shellfish surveys would not be applied in wind energy areas. Loss of survey areas would increase the uncertainty in estimates of fish and shellfish stock abundances and oceanographic parameters. If abundances, distributions, biological rates, or environmental parameters differ inside versus outside wind energy areas but cannot be observed, resulting survey indices could be biased and unsuitable for monitoring stock status. Similarly, resulting regional oceanographic time series could also be biased. A broad analysis for the NMFS bottom-trawl surveys that considered current and planned wind areas found that 9 out of 14 offshore strata that contribute most of the area sampled in the southern New England Mid-Atlantic region would likely be affected. Strata for fish and shellfish surveys are defined based on depth and alongshore features to delineate areas of relatively homogeneous species distributions. Random sampling within a stratum is a key attribute of statistical performance of these and many other typical survey designs.

The Vineyard Wind 1 lease area alone overlaps strata associated with three different coast-wide NEFSC fishery resource monitoring surveys. For the spring and fall multi-species bottom-trawl surveys, 6 percent of the area in one stratum would be within the Vineyard Wind 1 lease area. For the ocean quahog survey, 3 percent of the area in one stratum would be within the lease area. As a result, Alternative A would result in major impacts on NOAA's scientific surveys.

The impacts of other offshore wind projects would be similar, over an extended area. For the spring and fall multi-species bottom-trawl surveys, 16 of the southern New England Mid-Atlantic strata would be affected, although overlap is less than 1 percent in 2 strata. Between 3 and 60 percent of each remaining 14 stratum's area would be covered by offshore wind lease areas, including Vineyard Wind 1. The percent of area made unavailable would be higher in inshore strata (mean of 18 percent) than offshore strata (mean of 11 percent). Of the 14 offshore strata that contribute most of the area surveyed in the region, 9 are affected. In the case of offshore stratum 9, for example, which includes Vineyard Wind 1 and contiguous lease areas, up to 37 percent of the area could be unsampleable. For the integrated benthic/Atlantic sea scallop survey, four routinely sampled strata would likely be affected, with 3 to 12 percent of the stratum areas potentially unsampleable. For another two strata that are intermittently dredge sampled through the Virginia Institute of Marine Science Research Set Aside program, 21 to 56 percent of the area within those two strata would potentially be unsampleable. For the ocean quahog survey, 4 of 12 strata would include offshore wind lease areas, with 3 to 19 percent of the stratum areas potentially unsampleable. For the surf clam survey, 3 of 12 survey strata would include offshore wind lease areas, with 7 to 14 percent of the stratum areas potentially unsampleable. Low percentage overlaps for these two shellfish surveys may still have substantial impacts because there are only a few large strata in both surveys. Areas occupied by OECCs, which could not be trawled or dredged, are not included in these estimates. In summary, depending on the survey, up to 33 percent of strata within a survey would potentially be affected, and up to 60 percent of a single stratum within a survey would potentially be affected.

As noted above, removing survey effort to remaining areas that can be sampled would not mitigate the impacts. Without new alternative sampling methods and statistical designs, relocation of survey efforts would affect sampling accuracy. In addition, impacts could extend to operations outside wind energy areas, decreasing remaining survey precision. Based on layout and spacing of WTGs and current survey vessel operation policies, NMFS-supported vessels would not transit through wind energy lease areas. Alteration of survey vessel routes and resultant increased travel times would reduce survey productivity and precision.

**Protected species (cetaceans, sea turtles, and pinnipeds) research programs:** Aerial survey track lines at the altitude used in current cetacean and sea turtle abundance surveys (600 feet above mean sea level [AMSL]) could not occur in offshore wind areas because the planned maximum-case scenario WTG blade tip height (837 feet AMSL for Vineyard Wind 1 and 853 feet AMSL for other projects) would exceed the survey altitude with current surveying methodologies. The increased altitude necessary for safe survey operations could result in lower chances of detecting marine mammals and sea turtles, especially smaller species. At a minimum, NOAA Office of Marine and Aviation Operations pilots maintain a safety zone of at least 500 vertical feet from structures and hazards. The RI/MA Lease Areas comprise less than 1.5 percent of the aerial survey stratum, although the visual aerial abundance surveys for this stratum contributes to the estimates of 30 or more stocks of cetaceans and sea turtles. Thus, if animal distribution is not affected by offshore wind activities and NMFS surveys do not include these areas, the reduction in survey stratum area would have a minimal impact on abundance estimates for protected species. Impacts would be more substantial if the distribution and/or abundance within the RI/MA Lease Areas was different than the surrounding areas that continue to be surveyed.

Considerable survey efforts have been underway for years using digital aerial surveys for protected species in offshore wind areas. NMFS has begun investigating whether photographic abundance/monitoring surveys flown at a higher altitude are practical, reliable, and result in appropriately accurate and precise distribution and abundance estimates. More work is needed to confirm whether higher-altitude photographic survey methods are appropriate for abundance and monitoring surveys for all cetaceans, sea turtles, and pinnipeds.

A recent study found that the seven contiguous lease areas offshore Massachusetts and Rhode Island encompass important habitat that is utilized by NARWs (Leiter et al. 2017). Over one third of the current population, including up to 30 percent of known calving females, visited the RI/MA Lease Areas between 2010 and 2015. NMFS uses aerial surveys to collect photographs of the NARWs and other species to estimate abundance and monitor the health and status of individuals and populations. Shipboard surveys and small boat work also collect detailed data on NARWs, including photographs and drone images, biopsy samples, fecal samples, acoustic recordings, and other data types. Prey sampling in the vicinity of NARWs and in areas where they are not aggregating is being used to better characterize the habitat drivers behind their distribution. Finally, passive acoustic technology is used to monitor the presence of vocally active NARWs and other endangered large whale species throughout sites along the U.S. East Coast.

Development of offshore wind in the RI/MA Lease Areas would impact approximately 60 percent of the NARW aerial survey blocks in the area. NARW aerial surveys are currently conducted at 1,000 feet AMSL but would need to be conducted at higher altitudes to provide safety margins, as discussed above.

The inability to continue flights at current altitudes (600 or 1,000 feet AMSL) over offshore wind areas would have a significant impact on the ability to use current data collection techniques to monitor the distribution and abundance of marine mammals and sea turtles that may be caused by or are related to offshore wind. Alternative techniques to monitor these species could include high-altitude photographic surveys, passive acoustic monitoring, and data collection on small vessels (including those used by the industry) that can safely navigate within the WTGs.

The inability to implement shipboard surveys in current NARW habitat in offshore wind areas could significantly affect NMFS' ability to monitor the health, status, and behavior of individuals within this region, as well as NMFS' ability to monitor changes in prey distribution and other factors affecting NARW habitat use. With the operational restrictions on NOAA vessels entering developed lease areas, surveys within WDAs would necessarily require wind development-compatible vessels and equipment, which could lead to changes in survey methodology, available tools, and appropriate staffing of shipboard fieldwork. This would lead to less effective and efficient on-water data collection. Finally, the impact of collecting passive acoustic data in the region once offshore wind projects are developed is unknown. The use of autonomous vehicles, such as gliders, has been an important component in NMFS' near-real-time monitoring of NARW distribution, and the use of archival recorders has been important for documenting habitat use over time. It is unclear how this would change after the installation of WTGs, whether these data collection methodologies would still be feasible in these areas and how noise from operations (i.e., construction or vessel noise from long-term turbine maintenance) would affect NMFS' ability to continue to acoustically detect animals reliably. In summary, additional work is needed to develop and implement appropriate strategies to collect, analyze, interpret, and share data to monitor the impacts of wind energy activities on all protected species.

Significant resources would be required to quantify and account for the complexity and scope of impacts on NMFS core scientific surveys and the management advice that relies on these surveys and implement necessary survey adaptations. Potential challenges would include identification of appropriate sampling protocols and technology, development and parameterization of new statistical survey models, and calibration of new approaches to existing ones in order to continue to sample within areas occupied by turbine foundations and submarine cables. Preliminary analyses of the impacts on survey areal coverage shows substantial impacts on NMFS' ability to continue using current methods to fulfill its mission of precisely and accurately assessing fish and shellfish stocks for the purpose of fisheries management and assessing protected species for the purpose of protected species management. Changes to protected species survey methodologies could introduce biases or inaccuracies that could impact marine mammal abundance estimates and dedicated NARW studies. These changes could result in management implications for NARW and other protected species, as well as fisheries and shipping industries that impact these species. Similarly, changes to existing survey methodologies or disruption to the long-term survey time series of fish and shellfish would have implications for stock assessments by increasing uncertainty in biomass estimates and other parameters used in projecting fishery quotas. Uncertainty in estimating fishery quotas could lead to unintentional underharvest or overharvest of individual fish stocks, which could have both beneficial and adverse impacts on fish stocks, respectively. Based on existing regional Fishery Management Councils' acceptable biological catch control rule processes and risk policies (e.g., 50 CFR §§ 648.20 and 21), increased assessment uncertainty would likely result in lower commercial quotas that may reduce the likelihood of overharvesting and mitigate associated biological impacts on fish stocks. However, such lower quotas would result in lower associated fishing revenue that would vary by species, which could result in impacts on fishing communities. 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. Until a plan is established to holistically mitigate impacts on NMFS core surveys, information generated from project-specific monitoring plans may be necessary to supplement or complement existing survey data. Such monitoring plans must be developed in a comprehensive and integrated manner consistent with NOAA and NMFS' long-standing surveys. To address this need, these fisheries monitoring plans should be developed collaboratively with NOAA and NMFS and incorporate NMFS survey standards and requirements to ensure collected data is usable. BOEM will continue to work with the NMFS in regard to survey guidelines and update guidelines as appropriate to reflect standard data collection protocols and methodologies.

**Federal Survey Mitigation Program:** To address Vineyard Wind 1's impacts on NMFS trust responsibilities under the Magnuson-Stevens Fishery Conservation and Management Act, ESA, and Marine Mammal Protection Act, NMFS, in partnership with BOEM, is considering a mitigation program to establish resources for the NMFS NEFSC to design and implement effective survey adaptations. The intent of this mitigation program would be to minimize or avoid impacts from Vineyard Wind 1. If successful, this mitigation program could potentially be applied to future offshore wind projects. Specifically, NMFS recommends implementation of a mitigation program that includes the specific elements listed below to address Vineyard Wind 1's impacts on the multi-species bottom-trawl surveys, Atlantic scallop surveys, ocean quahog and Atlantic surf clam surveys, ecosystem monitoring surveys, marine mammal and sea turtle ship-based and aerial surveys, and NARW aerial surveys. While this mitigation is focused on Vineyard Wind 1, impacts from future offshore wind projects on NOAA scientific surveys would be mitigated through future coordination between BOEM and NOAA, as well as measures included in future National Environmental Policy Act analyses. These analyses would include consideration of the following mitigation measures as they apply to impacts from future projects:

- Evaluate survey designs—Evaluate and quantify Vineyard Wind 1's impacts on the listed scientific survey operations and on provision of scientific advice to management.
- Identify and develop new survey approaches—Evaluate or develop appropriate statistical designs, sampling protocols, and methods while determining if scientific data quality standards for the provision of management advice are maintained.
- Calibrate new survey approaches—Design and carry out necessary calibrations and required monitoring standardization to ensure continuity, interoperability, precision, and accuracy of data collections.
- Develop interim provisional survey indices—Develop interim ad hoc indices from existing non-standard data sets to partially bridge the gap in data quality and availability between pre-construction and operational periods while new approaches are being identified, tested, or calibrated.
- Wind energy monitoring to fill regional scientific survey data needs—Apply new statistical designs and carry out sampling methods to mitigate Vineyard Wind 1's survey impacts over the operational life span of Vineyard Wind 1.
- Develop and communicate new regional data streams—New data streams would require new data collection, analysis, management, dissemination, and reporting systems. Changes to surveys and new approaches would require substantial collaboration with fishery management, fishing industry, scientific institutions, and other partners.

The research and surveys listed above are a subset of all scientific research and surveys that may be executed in the geographic analysis area. Other scientific research surveys utilizing fixed data recorders, automated underwater vehicles, and small vessel research platforms may not be similarly impacted. There are currently no federal requirements to monitor or research construction and operations of offshore wind projects or for advancing new survey technologies. BOEM will continue to work with survey operators to better define and understand these impacts, including whether effective mitigation options could be available to compensate for the potential loss of some scientific surveys. Construction and decommissioning of Alternative A could lead to increased opportunities to study impacts of construction and operations of the offshore components, perform other oceanographic research, and develop or adapt new approaches to research including, but not limited to, use of unmanned aerial vehicles or vessels and remote sensing and digital technologies. Operations activities may present an opportunity to collaborate with researchers on data collection, thus potentially reducing survey costs. NOAA's Uncrewed Systems Strategy (NOAA 2020c), which aligns with the Commercial Engagement Through Technology Act of 2018 (Public Law 115-394), is intended to "directly improve the understanding, coordination, awareness and application of [unmanned systems]." In addition, sampling, monitoring, and/or research contributions from the offshore wind industry and other non-NOAA stakeholders (e.g., other federal or military agencies, industry partners, and academia) could play a key role in development of innovative approaches that would enable to scientific research and surveys to continue in offshore wind development areas. These approaches and opportunities help inform certain types of scientific research and surveys in the long term, but Alternative A would still have major impacts on existing NMFS scientific research and surveys conducted in and around the WDA because long-standing surveys would not be able to continue as currently designed, and extensive costs and efforts would be required to adjust survey approaches, potentially leading to impacts on fishery participants and communities (EIS Sections 3.6 and 3.10), as well as potential major impacts on monitoring and assessment activities associated with recovery and conservation programs for protected species. The loss of precision and accuracy would be a significant hurdle, as new data collection methods are tested and become usable and robust over time. Implementing mitigation measures, including the development of survey adaptation plans, standardization and calibration of sampling methods, and annual data collections following new designs and methods, would help reduce uncertainty in survey data and associated assessment results and increase the utility of additional data collected as part of any required project-specific monitoring plan.

In context of planned environmental trends, the impacts associated with ongoing and planned activities, including Alternative A, would have major impacts on NMFS' scientific research and surveys and the resulting stock assessments, which could lead to potential beneficial and adverse impacts on fish stocks when management decisions are based on biased or imprecise estimates of stock status. Alternative A would contribute to the overall impact rating primarily through placement of structures in the long term within the WDA that pose navigational hazards to survey aircraft and vessels and restrict access to survey locations, thus impacting statistical design of surveys and causing a loss of information within the wind development areas as previously described. Alternative A impacts are similar to those of other planned offshore wind development, but impacts would be spread across the RI/MA Lease Areas, affecting additional survey strata and survey areas. In context of planned environmental trends, the overall impacts on scientific research and surveys from ongoing and planned activities, including Alternative A, would qualify as major because entities conducting surveys and scientific research would have to make significant investments to change methodologies to account for unsampleable areas, with potential long-term and irreversible impacts on fisheries, the commercial fisheries community, protected species research, and programs for the conservation and management/recovery of fishery resources and protected species. While new research approaches and technologies may lessen impacts on scientific research and surveys in the long term, their results and applicability specific to the impacted NOAA and NMFS surveys are not planned at this time.

## B.4 Marine Mammal Sound Exposure Estimates

As discussed in EIS Section 3.7, Marine Mammals, marine mammals occur in the RI/MA Lease Areas. Noise from proposed Project-related impact pile driving, vibratory setting, drilling, potential detonations of unexploded ordnance (UXO), and high-resolution geophysical (HRG) surveys has the potential to cause auditory impacts (i.e., permanent threshold shift [PTS]/Level A harassment) and behavioral impacts (i.e., Level B harassment) to marine mammals. As defined by the Marine Mammal Protection Act (U.S. Code Title 16, Section 1362[18][C][i]), Level A harassment "has the potential to injure a marine mammal or marine mammal stock in the wild," while Level B harassment "has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."

Each activity has varying degrees of risk for auditory and behavioral impacts and are therefore discussed separately. The COP (Appendix III-M; Epsilon 2022) and the applicant's Letter of Authorization (LOA) application (JASCO 2022) modeled sound propagation for each activity. Two construction schedules (Schedule A and B) over a construction period of May through December were modeled for impact pile driving of WTG and ESP foundations (Tables B.1-22 and B.1-23). The months of January through April, when NARW are likely to be present in relatively high numbers, were excluded from the analysis as no impact pile driving of foundations is expected to occur during those months (JASCO 2022).

**Table B.1-22: Estimated Pile-Driving Days per Month for Proposed Project Construction Schedule A, All Years Summed**

| Construction Month | 12- Meter Monopile, 5,000 kJ | | 12-Meter Monopile, 6,000 kJ | | 13-Meter Monopile, 5,000 kJ | | 4-Meter Pin Pile, 3,500 kJ |
|---|---|---|---|---|---|---|---|
| | 1 Pile/Day | 2 Piles/Day | 1 Pile/Day | 2 Piles/Day | 1 Pile/Day | 2 Piles/Day | 4 Pin Piles/Day |
| May | 4 | 0 | 4 | 0 | 0 | 0 | 0 |
| June | 2 | 5 | 0 | 3 | 0 | 0 | 0 |
| July | 0 | 9 | 0 | 4 | 0 | 0 | 0 |
| August | 0 | 9 | 0 | 0 | 0 | 0 | 8 |
| September | 0 | 1 | 0 | 0 | 1 | 6 | 9 |
| October | 0 | 0 | 0 | 0 | 0 | 6 | 6 |
| November | 0 | 0 | 0 | 0 | 0 | 3 | 2 |
| December | 0 | 0 | 0 | 0 | 4 | 0 | 1 |
| **Total** | **6** | **24** | **4** | **7** | **5** | **15** | **26** |

Source: COP Appendix III-M, Table 3; Epsilon 2022

kJ = kilojoule

**Table B.1-23: Estimated Pile-Driving Days per Month for Proposed Project Construction Schedule B, All Years Summed**

| Construction Month | 12-Meter Monopile, 5,000 kJ | | 4-Meter Pin Pile, 3,500 kJ |
|---|---|---|---|
| | 1 Pile/Day | 2 Piles/Day | 4 Pin Piles/Day |
| May | 4 | 0 | 2 |
| June | 6 | 4 | 13 |
| July | 0 | 7 | 19 |
| August | 1 | 5 | 20 |
| September | 0 | 3 | 14 |
| October | 1 | 1 | 6 |
| November | 2 | 0 | 3 |
| December | 1 | 0 | 1 |
| **Total** | **15** | **20** | **78** |

Source: COP Appendix III-M, Table 4; Epsilon 2022

kJ = kilojoule

Estimates of marine mammal densities (animals per square kilometer) in the modeling used the Duke University Marine Geospatial Ecological Laboratory model results (Roberts et al. 2016a, 2016b, 2017, 2018, 2021) and included recently updated model results for the NARW. The 2021 NARW habitat density model includes new estimates for NARW abundance in Cape Cod Bay in December and the model predictions are summarized over three eras, 2003 to 2018, 2003 to 2009, and 2010 to 2018, to reflect the apparent shift in NARW distribution that occurred around 2010. As of June 2022, there are updated density data for other species besides the NARW; however, the impacts assessment in this section relies upon the previous version of density estimates for non-NARW species as provided in the LOA application (JASCO 2022). All densities used the May 1 through December 31 construction period. The COP (Appendix III-M; Epsilon 2022) calculated the density estimates for pinnipeds using Roberts et al. (2016a) density data.

### B.4.1 Marine Mammal Behavioral Response Thresholds

The applicant submitted comprehensive underwater acoustic propagation and animal exposure modeling for underwater sound and its potential impacts on marine species during piling installation for up to 132 WTG and/or ESP foundations (the proposed Project).[3] The applicant submitted the modeling results as a part of the COP (Appendix III-M; Epsilon 2022) and LOA application (JASCO 2022). Table B.1-24 summarizes the NMFS threshold criteria for PTS and Level A harassment used in the model.

**Table B.1-24: Permanent Threshold Shift Onset Acoustic Threshold Levels**

| Hearing Group | PTS Onset Thresholds to Evaluate Level A Harassment[a] (Received Level) | |
|---|---|---|
| | Impulsive | Non-impulsive |
| LFC | PK 219; $SEL_{24h}$ 183 | $SEL_{24h}$ 199 |
| MFC | PK 230; $SEL_{24h}$ 185 | $SEL_{24h}$ 198 |
| HFC | PK 202; $SEL_{24h}$ 155 | $SEL_{24h}$ 173 |
| PPW | PK 218; $SEL_{24h}$ 185 | $SEL_{24h}$ 201 |

Sources: NMFS 2018b; COP Appendix III-M; Epsilon 2022

µPa = micropascal; $\mu Pa^2s$ = micropascal squared second; dB = decibel; HFC = high-frequency cetacean (harbor porpoise [*Phocoena phocoena*]); PK = peak sound pressure level; $SEL_{24h}$ = sound exposure level over 24 hours [weighted by hearing group, in units of dB referenced to 1 $\mu Pa^2s$]; LFC = low-frequency cetacean (all the large whales except sperm whales [*Physeter macrocephalus*]); MFC = mid-frequency cetacean (all dolphins, pilot whales, and sperm whales); PPW = pinnipeds in the water (all seals); PTS = permanent threshold shift

[a] NMFS (2018a) uses a dual-metric acoustic thresholds for impulsive sounds, in which the largest isopleth (mapped distance) from either method is used for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the PK level thresholds associated with impulsive sounds, these thresholds should also be considered.

Because of the complexity and variability of marine mammal behavioral responses to acoustic exposure, NMFS has not yet released updated technical guidance on behavioral threshold criteria (Level B harassment; NMFS 2018b). The traditional method of assessing Level B harassment impacts on marine mammals from impulsive sources, which is currently recommended by NMFS (Endangered Fish and Wildlife; Notice of Intent to Prepare an Environmental Impact Statement, of the *Federal Register*, Volume 70, Issue 7 [January 11, 2005] p. 1871 [70 Fed. Reg. 7 p.1871), is an unweighted sound pressure level (SPL) of 160 decibels (dB) referenced to 1 micropascal (µPa). However, the application of a step function that evaluates weighted exposures as a percentage of animals responding between each step between different threshold levels has gained recent acceptance (Wood et al. 2012; Nowacek et al. 2015). Analyses of both approaches to assess the consequences of sound exposure on marine mammals can produce very different results (Farmer et al. 2018), because the unweighted root-mean-square SPL 160 dB threshold assumption that all animals respond equivalently generally produces greater exposure numbers

[3] Modeling used 132 foundations, although the current proposed Project Design Envelope only includes 130 positions. As a result, the model provides a conservative overestimate of potential impacts.

than the step function response approach. The COP (Appendix III-M; Epsilon 2022) applied both the NMFS-recommended unweighted and the frequency-weighted criteria (Wood et al. 2012) to estimate behavioral response to impulsive pile-driving sound (COP Appendix III-M, Table 8; Epsilon 2022). However, this impacts assessment relies on the ranges to the single step function threshold of SPL 160 dB referenced to 1 µPa (dB re 1 µPa) following the most current recommendations from NMFS (87 Fed. Reg. 126 [July 1, 2022]) and most applicable to marine mammals as an overall faunal group (Table B.1-25).

**Table B.1-25: Behavioral Exposure Criteria**

| | Probability of Response to Frequency-Weighted SPL[a] Impulsive Sources (dB re 1 µPa) | | | | Unweighted SPL[b] Impulsive and Non-impulsive, Intermittent Sources (dB re 1 µPa) | Unweighted SPL[b] Non-impulsive, Continuous Sources (dB re 1 µPa) |
|---|---|---|---|---|---|---|
| **Marine Mammal Group** | **120** | **140** | **160** | **180** | **160** | **120** |
| Harbor porpoise (*Phocoena phocoena*) | 50% | 90% | — | — | 100% | 100% |
| Migrating mysticete whales | 10% | 50% | 90% | - | 100% | 100% |
| All other species (and behaviors) | — | 10% | 50% | 90% | 100% | 100% |

Sources: COP Appendix III-M; Epsilon 2022

µPa = micropascal; dB = decibel; SPL = root-mean-square sound pressure level; re = referenced to
Probability of behavioral response frequency-weighted SPL (dB re 1 µPa [decibels referenced to 1 micropascal]); probabilities are not additive
[a] Source: Wood et al. 2012
[b] Source: NMFS-recommended threshold (87 Fed. Reg. 126 [July 1, 2022])

For UXO detonations, the exposure assessment conducted by JASCO (2022) used the sound exposure level (SEL)-based PTS thresholds from Table B.1-24, but Level B exposures were estimated using SEL-based temporary threshold shift (TTS) thresholds as shown in Table B.1-26. Additionally, given the nature of underwater explosions, potential mortality and non-auditory injury were considered in the modeling study using peak pressure and acoustic impulse thresholds from the U.S. Navy (Table B.1-27) following the methodology of Hannay and Zykov (2022).

**Table B.1-26: Temporary Threshold Shift Onset Acoustic Threshold Levels for Unexploded Ordnance Detonations**

| Hearing Group | TTS Onset Thresholds for Level B Harassment ($SEL_{24h}$) |
|---|---|
| LFC | 168 dB re 1 $\mu Pa^2$ s |
| MFC | 170 dB re 1 $\mu Pa^2$ s |
| HFC | 140 dB re 1 $\mu Pa^2$ s |
| PPW | 170 dB re 1 $\mu Pa^2$ s |

Sources: JASCO 2022; NMFS 2018b

$\mu Pa^2$ s = micropascal squared second; dB re 1 µPa = decibels referenced to 1 micropascal; HFC = high-frequency cetacean (harbor porpoise [*Phocoena phocoena*]); $SEL_{24h}$ = sound exposure level over 24 hours; LFC = low-frequency cetacean (all the large whales except sperm whales [*Physeter macrocephalus*]); MFC = mid-frequency cetacean (all dolphins, pilot whales, and sperm whales); PPW = pinnipeds in the water (all seals); TTS = temporary threshold shift

**Table B.1-27: Threshold Criteria for Non-Auditory Injury During Potential Detonation of Unexploded Ordnances**

| Impact Criterion | Threshold |
|---|---|
| Onset Mortality—Impulse | $103M^{1/3}(1+\frac{D}{10.1})^{1/6}\ Pa-s$ |
| Onset Injury—Impulse (non-auditory) | $47.5M^{1/3}(1+\frac{D}{10.1})^{1/6}\ Pa-s$ |
| Onset Injury—Peak Pressure (non-auditory) for marine mammals | PK 237 dB re 1 μPa |

Sources: COP Appendix III-M; Epsilon 2022; U.S. Navy 2017

D = animal depth; dB re 1 μPa = decibels referenced to 1 micropascal; M = animal mass in kilograms; Pa = pascal; PK = peak sound pressure level

JASCO modeled three levels of attenuation for impact pile driving: 0 dB (no attenuation), 10 dB, and 12 dB; and two levels of attenuation for potential UXO detonations: 0 dB and 10 dB (COP Appendix III-M; Epsilon 2022). The 0 dB level was modeled as a reference point to evaluate the effectiveness of the sound reduction technology (e.g., Hydro Sound Damper, bubble curtains, or similar) as proposed mitigation. When comparing the two potential levels of attenuation for impact pile driving (10 dB and 12 dB), 10 dB represents the lowest level of noise attenuation which would result in the greatest risk of impact on marine mammals aside from no attenuation. Although the applicant has proposed to achieve 12 dB attenuation, the EIS assesses an attenuation level of only 10 dB as a maximum-case scenario for all applicable activities.

### B.4.2 Noise Exposure from Impact Pile Driving

For impact pile driving, JASCO (2022) provides a 95th percentile exposure-based range ($ER_{95\%}$) to threshold criteria for a “most impactful” scenario that involves installation of up to two 12-meter (39-foot) and 13-meter (42-foot) monopiles per day and four 4-meter (13-foot) jacket piles per day for each marine mammal species with 10 dB attenuation. To determine the exposure-based ranges, pile strikes are propagated within the modeling assessment area to create an ensonified (sound filled) environment while simulated animals (i.e., animats) are moved about the ensonified area following known species-specific behaviors. Modeled animats that have received sound energy that exceeds the acoustic threshold criteria are registered, and the closest point of approach recorded at any point in that animal’s movement is then reported as its exposure range. This process is repeated multiple times for each animat to produce the exposure-based ranges, which comprise the closes point of approaches for 95 percent of animats that exceeded the threshold (i.e., $ER_{95\%}$).

The applicant’s requested take numbers for Level A harassment authorization were based on an expectation that 10 dB sound attenuation would be the minimal attenuation level achieved during the proposed activity. Information on sound reduction effectiveness reviewed in the COP (Appendix III-M; Epsilon 2022) and LOA application (JASCO 2022) included sources such as California Department of Transportation bubble curtain “on and off” studies conducted in San Francisco Bay in 2003 and 2004 (Caltrans 2015). A review of performance measured during impact driving for wind energy facility foundation installation (Bellmann et al. 2020) provides expected performance for common noise reduction system configurations. Measurements with a single bubble curtain and an air supply of 0.3 cubic meters per minute resulted in 7 to 11 dB of broadband attenuation for optimized systems in up to 131-foot water depth. Increased air flow (0.5 cubic meters per minute) may improve the attenuation levels up to 11 to 13 dB (JASCO 2022). Double bubble curtains add sound impedance and, for optimized systems, can achieve 15 to 16 dB of broadband attenuation (measured in up to 131-foot water depth). An IHC noise mitigation system can provide 15 to 17 dB of attenuation but is currently limited to piles under 8 meters in diameter. Other attenuation systems such as the AdBm noise mitigation system achieved 6 to

8 dB (JASCO 2022), while Hydro Sound Dampers were measured at 10 to 12 dB attenuation and are independent of depth (Bellmann et al. 200). Systems may be deployed in series to achieve higher levels of attenuation).

Based on the best available information (i.e., Bellmann et al. 2020; Caltrans 2015; JASCO 2022), it is reasonable to assume a greater level of effective attenuation due to implementation of noise attenuation during impact pile driving. The applicant has not identified the specific attenuation system that would ultimately be used during the proposed activity (e.g., what size bubbles and in what configuration a bubble curtain would be used, whether a double curtain would be employed, whether Hydro Sound Dampers, noise abatement system, or some other alternate attenuation device would be used). In the absence of specific information regarding the attenuation system that would be ultimately used, and in consideration of the available information on attenuation that has been achieved during impact pile driving, the EIS conservatively assumes that the lower-level effectiveness of 10 dB sound attenuation would be achieved (although greater noise attenuation may be achieved). No noise mitigation was included in the modeling for vibratory setting, drilling, or HRG surveys due to the relatively low risk of impact compared to the other proposed Project activities; however, vibratory setting and drilling would occur on the foundations prior to impact pile driving, so the noise attenuation systems used during impact pile driving would likely be in place for these activities (JASCO 2022) and would thus benefit from the attenuation properties.

The applicant would use a soft-start approach in which the initial hammer blows occur at reduced energy levels, allowing time for mobile animals to leave the affected area before hammer energy is gradually increased to the full hammer energy. Based on the geophysical data at the proposed Project location and assessment by the applicant's engineers, the full power capacity of the hammer is not necessary to install the foundations.

As shown in Tables B.1-22 and B.1-23, the maximum number of pile-driving days for the proposed Project is 113 under Construction Schedule B (COP Appendix III-M; Epsilon 2022), at the rate of up to two monopiles and four jacket pin piles installed per day (COP Appendix III-M, Tables 3 and 4; Epsilon 2022). The radial distances to sound threshold criteria were modeled using a 5,000 and 6,000 kilojoules (kJ) hammer energy for 12-meter and 13-meter-diameter monopiles, and a 3,500 kJ hammer energy for 4-meter-diameter jacket pin piles. Impact pile-driving noise with 10 dB attenuation has the potential to cause Level A and Level B harassment to marine mammals. The applicant would use sound-reducing technologies to minimize harmful impacts on marine mammals; however, attenuation levels may vary with local conditions such as water depth, current, and technology configuration.

Modeled $ER_{95\%}$ to Level B harassment with 10 dB attenuation during impact pile driving is lower for jacket piles (2.0 to 2.2 miles depending on the hearing group) compared to the monopiles (3.4 to 3.7 miles depending on the hearing group) for all marine mammals (Tables 3.7-6 and 3.7-7 in EIS Section 3.7) (COP Appendix III-M; Epsilon 2022). With a proposed target of 12 dB and maximum-case scenario of 10 dB attenuation, there is a risk of Level B harassment to marine mammals from pile driving due to the large radial distance to this threshold and the number of days that pile driving may occur.

Modeled $ER_{95\%}$ to thresholds for Level A harassment are greater for the two monopiles than the four jacket piles for all hearing groups (COP Appendix III-M; Epsilon 2022). When comparing all hearing groups, $ER_{95\%}$ are the largest for low-frequency cetaceans (LFC) (mysticetes). The isopleths for Level A harassment during impact pile-driving installation of a jacket foundation with 10 dB noise attenuation for NARW, fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), humpback whales, and minke whales average1.9 miles for jacket foundations (pin piles) and 2.2 miles for monopiles. These ranges can be effectively monitored using a combination of visual and acoustic monitoring as is proposed for this Project (EIS Appendix H, Mitigation and Monitoring).

Modeled $ER_{95\%}$ to thresholds for Level A harassment during monopile installation are moderate for seals (pinnipeds in water hearing group; 0.4 mile) and harbor porpoise (high-frequency cetacean [HFC] hearing group; 1.4 mile) and small for dolphins, pilot whales, and sperm whales (mid-frequency cetacean [MFC] hearing group; 3.2 feet).

For construction Schedule A, the exposure modeling in the LOA application (JASCO 2022) assumed that 89 monopile foundations and two jacket foundations are installed in year 1 and up to 18 monopiles and 24 jacket foundations are installed in year 2. The second year of Schedule A includes the potential installation of 13-meter monopiles using a 6,000 kJ hammer. The $ER_{95\%}$ for 13-meter monopile foundations using 6,000 kJ hammer energy were estimated using mathematical scaling rather than a full model in order to estimate mitigation zones that accommodate this design possibility while ensuring the protection of marine mammals (JASCO 2022). Construction Schedule A assumes that foundations for all of Phase 1 of the proposed Project (as defined in EIS Chapter 2, Alternatives) and a portion of Phase 2 are installed in year 1, and that the remaining Phase 2 foundations are installed in year 2.

Construction Schedule B is spread over 3 years, where year 1 includes 55 monopile and 3 jacket foundations and years 2 and 3 include 53 and 22 jacket foundations, respectively. In Schedule B years 2 and 3, jacket foundations are assumed for all positions because they provide a conservative envelope for any of the assessed monopile foundations, up to and including a 13-meter-diameter monopile with a 6,000 kJ hammer. Construction Schedule B assumes that foundations for all of Phase 1 are installed in year 1 and that the Phase 2 foundations are installed in years 2 and 3.

Tables B.1-28 and B.1-29 summarize the numbers of marine mammals estimated to experience sound levels above threshold criteria for Level A and B harassment for each construction schedule with 10 dB noise attenuation during impact pile driving (JASCO 2022). The exposure estimates integrate results from acoustic propagation models (which estimate three-dimensional sound fields resulting from pile driving), animal movement modeling (which provide probabilistic distributions of sound level exposures based on animal movement relative to modeled sound fields), and species density maps/models (which predict animal occupancy as a function of location and month). This modeling predicts the number of individual animals (for each species) that may be exposed to sound levels exceeding various criteria over the course of the two construction schedules. Generally, the numbers of marine mammals potentially exposed to impacts that may receive Level A harassment from pile driving are higher under construction Schedule B (JASCO 2022).

**Table B.1-28: Estimated Marine Mammal Exposure to Harassment Thresholds during Impact Pile Driving, Construction Schedule A[a]**

| Species | Level A Harassment (PK) | Level A Harassment ($SEL_{24h}$) | Level B Harassment (SPL) |
|---|---|---|---|
| Fin whale (*Balaenoptera physalus*)[b] | 0.04 | 21.51 | 33.58 |
| Humpback whale (*Megaptera novaeangliae*) | 0.05 | 13.69 | 16.46 |
| Minke whale (*Balaenoptera acutorostrata)* | 0.03 | 9.71 | 26.79 |
| North Atlantic right whale (*Eubalaena glacialis*)[b] | <0.01 | 3.09 | 7.01 |
| Sei whale (*Balaenoptera borealis*)[b] | <0.01 | 0.53 | 1.29 |
| Atlantic white-sided dolphin (*Lagenorhynchus acutus*) | 1.56 | 0.21 | 1,334.89 |
| Atlantic spotted dolphin (*Stenella frontalis*) | 0 | 0 | 3.92 |
| Common bottlenose dolphin (*Tursiops truncatus*) | 0.62 | 0.15 | 387.83 |
| Long-finned pilot whale (*Globicephala melas*) | 0.15 | 0.06 | 165.24 |
| Short-finned pilot whale (*Globicephala macrorhynchus*) | 0.24 | <0.01 | 121.26 |
| Risso's dolphin (*Grampus griseus*) | 0.03 | 0.02 | 6.23 |
| Common dolphin (*Delphinus delphis*) | 5.09 | 1.28 | 6,999.42 |
| Sperm whale (*Physeter macrocephalus*)[b] | <0.01 | <0.01 | 2.64 |
| Harbor porpoise (*Phocoena phocoena*) | 5.91 | 97.62 | 258.58 |
| Gray seal (*Halichoerus grypus*) | <0.01 | 1.07 | 32.11 |
| Harbor seal (*Phoca vitulina*) | 0.18 | 1.95 | 75.85 |
| Harp seal (*Pagophilus groenlandicus*) | 0 | 0.94 | 37.64 |

Source: COP Appendix III-M; Epsilon 2022

ESA = Endangered Species Act; PK = peak sound pressure level; $SEL_{24h}$ = sound exposure level over 24 hours; SPL = root-mean-square sound pressure level
[a] Data are for all construction years combined under construction Schedule A with 10 dB noise attenuation.
[b] ESA-listed species

**Table B.1-29: Estimated Marine Mammal Exposure to Harassment Thresholds during Impact Pile Driving, Construction Schedule B[a]**

| Species | Level A Harassment (PK) | Level A Harassment ($SEL_{24h}$) | Level B Harassment (SPL) |
|---|---|---|---|
| Fin whale (*Balaenoptera physalus*)[b] | 0.09 | 37.72 | 41.87 |
| Humpback whale (*Megaptera novaeangliae*) | 0.02 | 20.47 | 19.53 |
| Minke whale (*Balaenoptera acutorostrata*) | 0.03 | 20.59 | 50.89 |
| North Atlantic right whale (*Eubalaena glacialis*)[b] | <0.01 | 3.92 | 6.92 |
| Sei whale (*Balaenoptera borealis*)[b] | <0.01 | 1.14 | 1.88 |
| Atlantic white-sided dolphin (*Lagenorhynchus acutus*) | 1.17 | 0.87 | 2,385.18 |
| Atlantic spotted dolphin (*Stenella frontalis*) | 0.0 | 0.0 | 4.31 |
| Common bottlenose dolphin (*Tursiops truncatus*) | 0.41 | 0.31 | 526.97 |
| Long-finned pilot whale (*Globicephala melas*) | 0.14 | 0.18 | 260.80 |
| Short-finned pilot whale (*Globicephala macrorhynchus*) | 0.14 | 0.01 | 194.21 |
| Risso's dolphin (*Grampus griseus*) | 0.02 | 0.03 | 8.98 |
| Common dolphin (*Delphinus delphis)* | 5.16 | 2.52 | 8,248.25 |
| Sperm whale (*Physeter macrocephalus*)[b] | <0.01 | <0.01 | 4.60 |
| Harbor porpoise (*Phocoena phocoena*) | 8.82 | 173.78 | 400.40 |
| Gray seal (*Halichoerus grypus*) | <0.01 | 1.55 | 21.91 |
| Harbor seal (*Phoca vitulina*) | 0.10 | 3.85 | 77.88 |
| Harp seal (*Pagophilus groenlandicus*) | 0.0 | 1.42 | 36.14 |

Source: JASCO 2022

dB = decibel; ESA = Endangered Species Act; PK = peak sound pressure level; $SEL_{24h}$ = sound exposure level over 24 hours; SPL = root-mean-square sound pressure level
[a] Data are for all construction years combined under construction Schedule B with 10 dB noise attenuation.
[b] ESA-listed species

### B.4.3 Noise Exposure from Vibratory Pile Setting and Drilling

Exposures for vibratory setting and drilling activities were only calculated for Level B harassment thresholds because the estimate Level A threshold ranges were so small that no Level A harassment is expected to result from these activities (JASCO 2022). The range to the SPL 120 dB re 1 μPa threshold for non-impulsive, continuous sources was calculated and then used to estimate a daily impact area for each activity, calculated as the area of a circle where the radius is the range to the threshold. The threshold ranges were estimated to be 31 miles for vibratory setting and 13.4 miles for drilling, which resulted in impact areas of 3,032 and 561 square miles, respectively. For the exposure assessment, JASCO (2022) assumed that 50 percent of the foundations would face a risk of pile run and require vibratory setting prior to impact pile driving, and that approximately 30 percent of the foundation positions would encounter hard sediments and pile refusal, which would require drilling activities with a 20 percent contingency added to each. The total number of piles per month that may require vibratory setting or drilling under each construction schedule were then multiplied by the daily impact area and the average monthly density for each species to identify the total number of animals exposed each month. The exposure estimates in Tables B.1-30 and B.1-31 consist off all the monthly exposures added together for each construction schedule for vibratory setting and drilling, respectively.

**Table B.1-30: Estimated Number of Marine Mammals Exposed above Level B Harassment Thresholds during Vibratory Pile Setting (All Years Combined, Construction Schedules A and B)**

| Species | Construction Schedule A | Construction Schedule B |
|---|---|---|
| Fin whale (*Balaenoptera physalus*)[a] | 1,132.44 | 1,716.27 |
| Humpback whale (*Megaptera novaeangliae*) | 512.25 | 741.73 |
| Minke whale (*Balaenoptera acutorostrata*) | 395.04 | 596.72 |
| North Atlantic right whale (*Eubalaena glacialis*)[a] | 98.62 | 126.85 |
| Sei whale (*Balaenoptera borealis*)[a] | 33.85 | 50.60 |
| Atlantic white-sided dolphin (*Lagenorhynchus acutus*) | 13,457.37 | 20,033.03 |
| Atlantic spotted dolphin (*Stenella frontalis*) | 417.37 | 605.86 |
| Common bottlenose dolphin (*Tursiops truncatus*) | 22,148.79 | 33,705.52 |
| Long-finned pilot whale (*Globicephala melas*) | 1,705.43 | 2,489.92 |
| Short-finned pilot whale (*Globicephala macrorhynchus*) | 1,257.88 | 1,836.50 |
| Risso’s dolphin (*Grampus griseus*) | 477.82 | 703.87 |
| Common dolphin (*Delphinus delphis*) | 44,577.24 | 62,093.43 |
| Sperm whale (*Physeter macrocephalus*)[a] | 77.51 | 122.20 |
| Harbor porpoise (*Phocoena phocoena*) | 4,184.38 | 5,825.78 |
| Gray seal (*Halichoerus grypus*) | 3,310.76 | 4,574.98 |
| Harbor seal (*Phoca vitulina*) | 7,438.42 | 10,278.79 |
| Harp seal *(Pagophilus groenlandicus*) | 3,310.76 | 4,574.98 |

Source: JASCO 2022

[a] ESA-listed species

**Table B.1-31: Estimated Number of Marine Mammals Exposed above Level B Harassment Thresholds during Drilling (All Years Combined, Construction Schedules A and B)**

| Species | Construction Schedule A | Construction Schedule B |
|---|---|---|
| Fin whale (*Balaenoptera physalus*)[a] | 197.73 | 203.56 |
| Humpback whale (*Megaptera novaeangliae*) | 102.86 | 104.67 |
| Minke whale (*Balaenoptera acutorostrata*) | 68.43 | 81.75 |
| North Atlantic right whale (*Eubalaena glacialis*)[a] | 20.93 | 25.99 |
| Sei whale (*Balaenoptera borealis*)[a] | 5.97 | 7.56 |
| Atlantic white-sided dolphin (*Lagenorhynchus acutus*) | 2,986.88 | 3,301.08 |
| Atlantic spotted dolphin (*Stenella frontalis*) | 71.01 | 65.08 |
| Common bottlenose dolphin (*Tursiops truncatus*) | 1,324.85 | 1,228.61 |
| Long-finned pilot whale (*Globicephala melas*) | 349.74 | 349.74 |
| Short-finned pilot whale (*Globicephala macrorhynchus*) | 257.96 | 257.96 |
| Risso's dolphin (*Grampus griseus*) | 30.33 | 27.70 |
| Common dolphin (*Delphinus delphis*) | 7,612.20 | 7,008.30 |
| Sperm whale (*Physeter macrocephalus*)[a] | 13.49 | 12.66 |
| Harbor porpoise (*Phocoena phocoena*) | 674.36 | 743.11 |
| Gray seal (*Halichoerus grypus*) | 241.90 | 313.27 |
| Harbor seal (*Phoca vitulina*) | 543.48 | 703.84 |
| Harp seal (*Pagophilus groenlandicus*) | 241.90 | 313.27 |

Source: JASCO 2022

[a] ESA-listed species

### B.4.4 Noise Exposure from Unexploded Ordnance

Due to the mitigation and monitoring measures proposed (EIS Appendix H) and the relatively small size of the peak pressure and acoustic impulse threshold ranges for UXO detonations compared to PTS and TTS ranges, no non-auditory injury or mortality is expected for any species (JASCO 2022). For potential UXO detonations, the modeling followed the study conducted by Hannay and Zykov (2022), which groups potential UXOs into five "bins" based on the maximum UXO charge weights (Table 41 in JASCO 2022). These activities could potentially expose animals to Level A and Level B TTS. The radial distances to the SEL-based criteria ranges for PTS and TTS for UXO detonations with 10 dB attenuation are provided in the LOA application (Table 42, JASCO 2022). The LFC radial threshold distances range from 2 miles in shallow water (12 meters/39 feet or less) to 2.2 miles in deep water (45 meters/147 feet or more) while the HFC distances hover around from 3.8 miles in shallow and deep water. Exposures for potential UXO detonations were estimated by multiplying the impact areas in the LOA application Table 42, JASCO 2022) by the highest monthly species density in the deep water OECC segment and the SWDA for the 20- to 45-meter (66- to 147-foot) depths, and by the highest monthly species density in the shallow water OECC segment for the 12-meter (39-foot) depth (JASCO 2022). The result of the areas multiplied by the densities were then multiplied by the number of UXOs estimated at each of the depths from preliminary geophysical and camera survey data to calculate total estimated exposures in Table B.1-32.

**Table B.1-32: Maximum Estimated Marine Mammal Exposure above Harassment Thresholds Due to Unexploded Ordinance Detonations[a]**

| Species | Level A Harassment ($PTS\ SEL_{24h}$) | Level B Harassment ($TTS\ SEL_{24h}$) |
|---|---|---|
| Fin whale (*Balaenoptera physalus*)[b] | 1.31 | 13.34 |
| Humpback whale (Megaptera novaeangliae) | 1.51 | 15.48 |
| Minke whale (Balaenoptera acutorostrata) | 0.95 | 9.68 |
| North Atlantic right whale (*Eubalaena glacialis*)[b] | 3.17 | 32.30 |
| Sei whale (Balaenoptera borealis)[b] | 0.17 | 1.73 |
| Atlantic white-sided dolphin (*Lagenorhynchus acutus*) | 0.27 | 10.23 |
| Atlantic spotted dolphin (*Stenella frontalis*) | 0.01 | 0.20 |
| Common bottlenose dolphin (*Tursiops truncatus*) | 0.90 | 30.33 |
| Long-finned pilot whale (*Globicephala melas*) | 0.03 | 0.96 |
| Short-finned pilot whale (*Globicephala macrorhynchus*) | 0.02 | 0.71 |
| Risso's dolphin (*Grampus griseus*) | 0.00 | 0.07 |
| Common dolphin (*Delphinus delphis*) | 1.25 | 47.01 |
| Sperm whale (*Physeter macrocephalus*)[b] | 0.00 | 0.05 |
| Harbor porpoise (*Phocoena phocoena*) | 165.32 | 801.06 |
| Gray seal (*Halichoerus grypus*) | 8.91 | 180.73 |
| Harbor seal (*Phoca vitulina*) | 20.01 | 406.05 |
| Harp seal (*Pagophilus groenlandicus*) | 8.91 | 180.73 |

Source: JASCO 2022

$\mu Pa^2 s$ = micropascal squared second; ESA = Endangered Species Act; PTS = permanent threshold shift; $SEL_{24h}$ = sound exposure level over 24 hours [weighted by hearing group, in units of dB referenced to 1 $\mu Pa^2 s$]; TTS = temporary threshold shift; UXO = unexploded ordnance

[a] Data are for possible detonation of up to 10 UXOs with 10 dB noise attenuation.

[b] This is an ESA-listed species.

### B.4.5 Noise Exposure from High-Resolution Geophysical Surveys

Proposed HRG surveys assume the use of two pieces of equipment: the Applied Acoustics AA251 Boomer and the GeoMarine Geo Spark 2000 (JASCO 2022). No Level A exposures are expected to occur during HRG surveys from either type of equipment. Level B exposures were estimated using a similar method as described previously for vibratory setting a drilling. The daily impact area was calculated as a circle around the source with the radius being the range to the threshold (SPL 160 dB re µPa for HRG equipment as they are non-impulsive, intermittent sources) multiplied by the average annual density for each species and the total number of expected survey days per year (assumed to be 25) (JASCO 2022). This results in the estimate number of Level B exposures annually for each equipment presented in Table B.1-33

**Table B.1-33 Estimated Marine Mammal Exposure above Level B Harassment Thresholds Annually during High-Resolution Geophysical Surveys**

| Species | Applied Acoustics AA251 Boomer | GeoMarine Geo Spark 2000 |
|---|---|---|
| Fin whale (*Balaenoptera physalus*)[a] | 2.67 | 2.11 |
| Humpback whale (*Megaptera novaeangliae*) | 2.09 | 1.65 |
| Minke whale (*Balaenoptera acutorostrata*) | 1.82 | 1.44 |
| North Atlantic right whale (*Eubalaena glacialis*)[a] | 6.44 | 0.26 |
| Sei whale (*Balaenoptera borealis*)[a] | 0.32 | 112.02 |
| Atlantic white-sided dolphin (*Lagenorhynchus acutus*) | 56.24 | 261.41 |
| Atlantic spotted dolphin (*Stenella frontalis*) | 0.93 | 3.29 |
| Common bottlenose dolphin (*Tursiops truncatus*) | 255.89 | 202.55 |
| Long-finned pilot whale (*Globicephala melas*) | 4.22 | 3.34 |
| Short-finned pilot whale (*Globicephala macrorhynchus*) | 3.12 | 2.47 |
| Risso's dolphin (*Grampus griseus*) | 0.38 | 0.30 |
| Common dolphin (*Delphinus delphis*) | 197.42 | 156.27 |
| Sperm whale (*Physeter macrocephalus*)[a] | 0.26 | 0.21 |
| Harbor porpoise (*Phocoena phocoena*) | 112.02 | 88.67 |
| Gray seal (*Halichoerus grypus*) | 261.41 | 206.92 |
| Harbor seal (*Phoca vitulina*) | 3.29 | 587.32 |
| Harp seal (*Pagophilus groenlandicus*) | 1.46 | 261.41 |

Source: JASCO 2022

[a] ESA-listed species

## B.4.6 Incidental Take Requested

For the proposed Project, the calculated exposure figures in Tables B.1-28 through B.1-33 differ from the total number of takes requested in the LOA application (JASCO 2022). The requested numbers shown in Table B.1-34 were adjusted from the calculated exposures using the following assumptions, summarized from JASCO (2022):

- For impact pile driving, the greater of the two Level A exposure estimates (sound exposure level over 24 hours [$SEL_{24h}$] or peak sound pressure level [PK]) was rounded up to a whole number and used to compute the requested Level A take.
- Although it was calculated, no Level A take for NARW from any activity was requested because of the proposed mitigation and monitoring measures.
- For the total requested take for impact pile driving, the estimated exposures were corrected for two average group sizes for construction Schedule A (2-year schedule) and for three average groups sizes under construction Schedule B (3-year schedule) using the group size data in LOA application Table 15.
- The total requested take used the construction schedule that resulted in the greatest number of estimated Level B exposures during impact pile driving, vibratory setting, and drilling when all years were combined and rounded up to a whole number for each species (i.e., construction Schedule B was assumed for all species except NARW, gray seals [*Halichoerus grypus*], and harp seals [*Pagophilus groenlandicus*]).

- For days when pile installation was assumed to include both vibratory setting and drilling, only Level B take from vibratory setting was included in the total number of requested takes to avoid double counting as this activity resulted in the greater number of estimated exposures.
- Exposure estimates for potential UXO removal were rounded up to a whole number.
- For HRG surveys, the equipment resulting in the greatest number of estimated exposures was carried forward in the total requested take.
- Common dolphin (*Delphinus delphis*) exposures during HRG surveys were increased to 2,000 for the 5 years of HRG surveys based on protected species observer data collected during surveys in 2020-2021 (JASCO 2022).

**Table B.1-34: Total Requested Incidental Take[a]**

| Species | Takes by Level A Harassment | Takes by Level B Harassment | Total Takes Proposed for Authorization | Total Takes as a Percentage of Stock Taken |
|---|---|---|---|---|
| Fin whale (*Balaenoptera physalus*) | 40 | 1,948 | 1,988 | 29.23 |
| Humpback whale (*Megaptera novaeangliae*) | 23 | 878 | 901 | 64.54 |
| Minke whale (*Balaenoptera acutorostrata*) | 22 | 740 | 762 | 3.47 |
| North Atlantic right whale (*Eubalaena glacialis*) | 0 | 228 | 228 | 61.96 |
| Sei whale (*Balaenoptera borealis*) | 3 | 76 | 79 | 1.26 |
| Sperm whale (*Physeter macrocephalus*) | 1 | 149 | 150 | 3.45 |
| Atlantic white-sided dolphin (*Lagenorhynchus acutus*) | 3 | 25,510 | 25,513 | 27.36 |
| Atlantic spotted dolphin (*Stenella frontalis*) | 1 | 898 | 899 | 2.25 |
| Common bottlenose dolphin (*Tursiops truncatus*) | 2 | 36,505 | 36,507 | 58.08 |
| Long-finned pilot whale (*Globicephala melas*) | 2 | 3,114 | 3,116 | 7.95 |
| Short-finned pilot whale (*Globicephala macrorhynchus*) | 2 | 2,283 | 2,285 | 7.90 |
| Risso's dolphin (*Grampus griseus*) | 1 | 782 | 783 | 2.22 |
| Common dolphin (*Delphinus delphis*) | 8 | 78,887 | 78,895 | 45.61 |
| Harbor porpoise (*Phocoena phocoena*) | 340 | 8,244 | 8,584 | 8.98 |
| Gray seal (*Halichoerus grypus*) | 11 | 6,390 | 6,401 | 23.45 |
| Harbor seal (*Phoca vitulina*) | 25 | 14,382 | 14,407 | 23.49 |
| Harp seal (*Pagophilus groenlandicus*) | 11 | 6,405 | 6,416 | 0.08 |

Source: JASCO 2022

[a] The total requested take is based on calculated exposures for all noise-producing proposed Project activities previously described. However, for days when pile installation includes both vibratory setting and drilling, only the vibratory setting Level B takes are included to avoid double counting as this activity resulted in the greater number of estimated exposures.

BOEM reviewed all marine mammal sound exposure and take estimate information taken from the COP (Appendix III-M; Epsilon 2022) and summarized herein. NMFS reviewed the sound exposure and take estimates as part of the applicant's incidental take request in its LOA application (JASCO 2022) submitted under the Marine Mammal Protection Act. The information in the application, including the effectiveness of the proposed mitigation, was evaluated to estimate the potential take numbers of marine mammals.

The applicant's self-imposed measures of using soft start, protected species observers, and passive acoustic monitoring would reduce the risk of threshold-level exposures to marine mammals. The applicant's self-imposed measures are described in detail in EIS Appendix H. Based on the analysis, there is a negligible to minor risk of Level A harassment and a moderate risk of Level B harassment to marine mammals from the combined noise-producing activities (impact pile driving of foundations, vibratory setting, drilling, and HRG surveys). Level B risks are moderate due to the large radial distances to acoustic thresholds produced during piling, vibratory setting, and drilling activities, which results in high take estimates, particularly when applying the non-impulsive noise criteria; and the potential TTS-level exposures resulting from UXO detonations. Level B risks for HRG surveys are negligible. Therefore, BOEM considers impacts from all activities to be moderate for all marine mammals. BOEM could further reduce potential impacts on marine mammals by implementing mitigation and monitoring measures outlined in EIS Appendix H, which could include long-term passive acoustic monitoring; daily, pre-construction passive acoustic monitoring and visual surveys; and the sunrise and sunset prohibition on pile driving as well as requiring the use of noise reduction technologies during all pile-driving activities to achieve a required minimum broadband attenuation (reduction) of 10 dB.

The specific noise attenuation technologies for the proposed Project have not yet been selected. Potential options include a Noise Mitigation System, Hydro Sound Damper, Noise Abatement System, a bubble curtain(s), another similar technology, or a combination of several systems (COP Appendix III-M; Epsilon 2022; JASCO 2022). In addition to the use of noise attenuation system(s), the applicant has committed to complete sound field verification and to have a second attenuation technology on hand, which would be deployed if sound field verification demonstrates a need for greater attenuation. Exposure estimates and underwater noise associated with the proposed Project and the resulting anticipated take of marine mammals is based upon achieving 10 dB reduction of pile-driving noise and potential UXO detonation noise using one or multiple sound attenuation technologies. Should greater attenuation be achieved, fewer individuals than estimated would be exposed to harassing or injurious levels of sound. These measures would reduce noise impacts during construction and the likelihood of impacts on individual marine mammals but would not result in a change to the significance level of impacts.

### B.4.7 Summary

As described above, the applicant modeled the potential for marine mammal to be exposed to Project-related harassing or injurious sound levels that may result in take, as defined by the ESA. BOEM has initiated interagency consultation with NMFS under ESA Section 7. Table B.1-35 presents the maximum amount of marine mammal take for ESA-listed species and is consistent with the amount of Level A and B harassment that is presented in the LOA application (JASCO 2022).

**Table B.1-35: Take of Endangered Species Act-listed Marine Mammals due to Exposure to All Potential Noise-Producing Proposed Project Activities with 10 Decibel Noise Attenuation[a]**

| Species | TTS/Behavioral Response | Auditory Injury (PTS) |
|---|---|---|
| North Atlantic right whale (*Eubalaena galcialis*) | 228 | 0 |
| Fin whale (*Balaenoptera physalus*) | 1,948 | 40 |
| Sperm whale (*Physeter macrosephalus*) | 149 | 1 |
| Sei whale (*Balaenoptera borealis*) | 76 | 3 |

Source: JASCO 2022

PTS = permanent threshold shift; TTS = temporary threshold shift; UXO = unexploded ordnance
[a] Noise attenuation was only applied to the take calculations for impact pile driving and potential UXO detonations.

## B.5 Impacts on Marine Mammals Potentially Present in the Proposed Project Area

This section provides supplemental information for the discussion of potential impacts on marine mammals provided in EIS Section 3.7 for species that may face additional risk from certain impact-producing factor (IPF) based on their current population status and life history traits that make them more susceptible to anthropogenic impacts. All factors that would influence the risk of impacts are discussed in the following subsections.

### B.5.1 North Atlantic Right Whales

NARWs are considered one of the most critically endangered populations of large whales in the world (Hayes et al. 2022). The best current estimate of the living population is 364 whales (Hayes et al. 2022). Since 2010, NARW distribution and patterns of habitat use have shifted, in some cases dramatically (Pettis et al. 2022) and the size of this stock is conserved to be extremely low relative to the optimal sustainable yield (Hayes et al. 2022). The current potential biological removal (PBR) for this stock 0.7 based on the minimum population size and net productivity rate (Hayes et al. 2022), which indicates that removal of any individual from the population could have long-term consequences for the continued viability of the stock.

Eighteen new calves were sighted during the 2021 calving season (Pettis et al. 2022), an increase from 10 calves observed in 2020, and 15 new calves have been sighted so far for the 2022 calving season (NMFS 2022a). Although the increasing birth rate is a beneficial sign, it is still significantly below what is expected, and the rate of mortality is still higher than what is sustainable (Hayes et al. 2022; Pettis et al. 2022). A reduction in adult female survival rates relative to male survival rates has caused a divergence between male and female abundance. In 1990, there were an estimated 1.15 males per female, and by 2015, estimates indicated 1.46 males per female (Pace et al. 2017). This combination of factors threatens the survival of this species (Pettis et al. 2017, 2022). If reduced *Calanus finmarchicus* (the primary prey of NARW) abundance results in a decrease in reproduction similar to that observed in the late 1990s, which authors hypothesize has occurred during the past 5 years, extinction of the NARW could take place in as little as 27 years (Meyer-Gutbrod et al. 2018).

Elevated NARW mortalities documented beginning in 2017 prompted NMFS to declare an unusual mortality event (UME) for this species. A total of 34 confirmed mortalities with an additional 21 free-swimming individuals with serious injury and 37 individuals with sub-lethal injury or illness have been documented to date (NMFS 2022b). Twenty-one of the 34 mortalities were located in Canada and 13 were in the United States (NMFS 2022b). Human interactions (i.e., fishery-related entanglements and vessel strikes) have been identified as the most likely cause of this UME. Of the 34 documented mortalities, 11 have been attributed to vessel strikes and 9 to entanglements (NMFS 2022b). In addition to this recent UME, the reproductive output for the species has declined by 40 percent since 2010 (Kraus et al. 2016b).

Records from 2015 through 2019 indicate an annual average human-caused mortality and serious injury of 5.7 individuals per year by fisheries entanglement and 2.0 individuals per year by vessel strike (86 Fed. Reg. 58887 [October 25, 2021]). Kraus et al. (2016b) suggests that threats to the population are still pervasive and may be getting worse. Indicators of this trend include declining overall body condition (Rolland et al. 2016) and very high and increasing rates of entanglement in fishing gear (Knowlton et al. 2012, 2016), suggesting previous management interventions have not measurably reduced entanglement or entanglement-related mortality (Pace et al. 2014). Research has revealed the substantial energy drain on individual whales from drag related to ongoing entanglements, which likely results in reduced health and fitness (van der Hoop et al. 2015, 2017). Other studies indicate noise from shipping increases stress hormone levels (Rolland et al. 2012), and modeling suggests that their communication space can be reduced substantially by vessel noise in busy traffic lanes (Hatch et al. 2012). In addition to anthropogenic threats, NARWs also face environmental stressors including algal toxins, oceanographic changes from climate change, and, as discussed above, reduced prey availability (Rolland et al. 2007; Doucette et al. 2012; Fortune et al. 2013).

The greatest risk to NARW is from vessel traffic and interactions with fishing gear, which would be present both with and without the Proposed Action. Given the number of vessel strikes documented under the UME, ongoing activities which are not associated with offshore wind development are a large driver of the risk to NARW. These impacts would be expected to continue and potentially increase with the additional vessel traffic associated with future offshore wind projects. However, offshore wind projects would adhere to vessel strike avoidance measures such as visual monitoring and speed restrictions which would reduce the risk of vessel strikes and associated mortality. Similarly, the risk faced by entanglements in fishing gear is a result of ongoing non-offshore wind activities given the number of records under the existing UME. The presence of offshore wind structures (i.e., WTG and ESP foundations) could contribute to the risk of entanglement if discarded fishing gear were caught in the structures. All other IPFs discussed in the DEIS are not expected to result in mortality. Noise-producing activities such as impact pile driving and potential UXO detonations could result in auditory injury, but with mitigation measures such as noise attenuation devices reducing the sound produced by these activities by 10 decibels (COP Appendix III-M; Epsilon 2022); visual and acoustic monitoring before, during and after the activity; seasonal restrictions dictating these activities would only occur between May and December, outside the key seasons which NARW are present in the proposed Project area; and shutdown and ramp-up procedures for impact pile driving, no long-term effects that would rise to the population level are expected to occur due to noise for this species.

### B.5.2 Fin Whales

Fin whales in the proposed Project area are listed as Endangered under the ESA (Hayes et al. 2022). The current best abundance estimate available for this stock is 6,802 individuals (Hayes et al. 2022). For 2015 through 2019, the minimum annual rate of human-caused (i.e., vessel strike and entanglement in fishery gear) mortality and serious injury was 1.85 per year (Hayes et al. 2022). There are insufficient data to determine the population trend for fin whales.

Similar to NARW, the greatest risk of vessel strike and entanglement are from ongoing non-offshore wind activities, and the addition of vessel traffic and fishing gear impacts from planned offshore wind development would not appreciably contribute to additional risk to this species. This species has a PBR of 11 individuals; with only up to two individuals documented sustaining serious injury or mortality (Hayes et al. 2022), the likelihood of mortalities exceeding the PBR is low. This species does face a slightly higher risk of exposure to noise sufficient to result in auditory injuries from the Proposed Action because the proposed construction window of May through December overlaps with the season that fin whales are expected to have higher densities in the proposed Project area. However, auditory injuries do not result in mortality or prevent an individual from reproducing and foraging, so this would not count as a removal of the individual from the population. Additionally, while the total number of fin whales exposed to above-threshold noise exceeds the annual PBR (JASCO 2022), the other mitigation measures listed previously for NARW reduce the potential risk of these exposures.

### B.5.3 Sei Whales

Sei whales occurring in the proposed Project area are listed as Endangered under the ESA. The current best abundance estimate for this stock is 6,292 individuals (Hayes et al. 2022). Between 2015 and 2019, the average annual minimum human-caused mortality and serious injury was 0.8 sei whale per year (Hayes et al. 2022).

Similar to NARW and fin whales, the primary threats to sei whales include vessel strike and entanglement in fisheries gear. The greatest risk from these IPFs is a result of ongoing, non-offshore wind activities and the planned offshore wind projects would not appreciably contribute to increase risk to this species. Additionally, sei whales are expected to be present in low numbers in the proposed Project area, and the total number of individuals exposed per year to noise above the auditory injury thresholds (JASCO 2022) are below the annual PBR of 6.2 individuals (Hayes et al. 2022); therefore, potential impacts would not be expected to result in population-level effects.

### B.5.4 Humpback and Minke Whales

Neither humpback or minke whales in the proposed Project area are listed under the ESA (Hayes et al. 2021, 2022); however, an active UME has been declared for both species due to suspected human interactions from vessel strike, entanglement, or infectious disease (NMFS 2022b, 2022c). Since 2016, there have been 161 reported humpback whale strandings along the U.S. East Coast, approximately a quarter of which showed evidence of human interaction from either a vessel strike or entanglement (NMFS 2022b). Available data indicate that this stock of humpback whale is characterized by a positive population trend, with an estimated increase in abundance of 2.8 percent per year (Hayes et al. 2021). The PBR for humpback whales is 22, and the estimated annual human-caused mortality and serious injury between 2014 and 2018 was 15.25 whales per year (Hayes et al. 2021). The UME for minke whales was declared in 2017 and 123 strandings have been reported along the U.S. East Coast (NMFS 2022c). Preliminary findings from necropsy conducted on approximately 60 percent of the stranded whales indicate evidence of human interactions or infectious diseases (NMFS 2022c). There are no current population trends or net productivity rates for this species due to insufficient data. The PBR for this stock is estimated to be 170 (Hayes et al. 2022). The estimated annual human-caused mortality and serious injury from 2015 to 2019 was 10.55 per year attributed to fishery interactions, vessel strikes, and non-fishery entanglement in both the United States and Canada (Hayes et al. 2022).

Similar to the other species discussed, the greatest risk of vessel strike and entanglement in fisheries gear is a result of ongoing, non-offshore wind activities, and the planned offshore wind development would not appreciably contribute to increased risk for this species. The total number of annual exposures estimated for these species for noise meeting or exceeding the auditory injury thresholds (JASCO 2022) is lower than the PBR for each species indicating that risk of any consequences to the population due to proposed Project-related noise is low.

### B.5.5 Sperm Whales

Sperm whales present in the proposed Project area are listed as Endangered under the ESA as a single, global population. The best available estimate for the North Atlantic stock, which is expected to occur in the proposed Project area, is 4,349 individuals (Hayes et al. 2020). There were no reports of fishery-related mortality or serious injury between 2013 and 2017. While there were 12 strandings documented during this period, none showed any indications of human interaction (Hayes et al. 2020).

No vessel strikes for this species have been reported since 2013. However, sperm whales do face a risk from this IPF (Hayes et al. 2022). As discussed previously, ongoing activities from non-offshore wind projects are expected to result in the greatest risk for this species, but future offshore wind development would not appreciably contribute to this risk. This species, unlike the other species previously discussed, belong to the MFC hearing group (NMFS 2018b) so the risk of experiencing noise above auditory injury thresholds is lower than the baleen whale species belonging to the low-frequency cetacean (LFC) hearing group. As a result, the number of calculated exposures to the auditory injury thresholds was <0.01 for all schedules modeled for both impact pile driving and potential UXO detonations (JASCO 2022). Therefore, the risk of any consequences to the population due to proposed Project-related noise is expected to be negligible.

### B.5.6 All Other Mid-Frequency Cetacean Species

The other dolphin and small whale species that belong to the MFC hearing group expected to occur in the proposed Project area are not listed under the ESA and are therefore expected to be less susceptible to potential impacts from Alternative A and Alternative B. The estimated annual auditory injury exposures for all these species (JASCO 2022) are below the annual PBR (Table 3.7-3 in EIS Section 3.7, Marine Mammals) so the risk of any consequences to the population due to proposed Project-related noise is expected to be low. Based on the most recent stock assessment reports available for these species, they also face a risk of entanglement in fishing gear, but the number of reported mortalities and serious injuries from the past few years does not exceed the PBR (Hayes et al. 2022) and would therefore not be expected to result in population-level consequences. Although smaller cetaceans are also at risk of vessel strikes, these species tend to be more agile, powerful swimmers and are more capable of avoiding collisions with oncoming vessels (MMS 2007).

Ongoing, non-offshore wind activities present a risk of entanglement in fishing gear that would not be expected to increase as a result of planned offshore wind activities; however, the presence of offshore wind structures may result in discarded fishing gear being caught around the foundations, creating an entanglement risk for MFC species. This risk notwithstanding, the presence of gear caught in foundations is not likely to increase the number of injuries resulting from interactions above the PBR for any species, and the reef effect from the presence of the structures would present a beneficial effect for dolphin species. The increase in fish aggregating around the foundations would present many feeding opportunities for smaller species of dolphins with low body fat percentages (that require multiple feedings) or mother/calf pairs (that have been observed repeatedly at structures in the literature) (Hammar et al. 2010; Lindeboom et al. 2011).

### B.5.7 Harbor Porpoises

Harbor porpoises present in the proposed Project area are not listed under the ESA (Hayes et al. 2022). The best available abundance estimate for the Gulf of Maine/Bay of Fundy stock occurring in the proposed Project area is 95,543 based on combined survey data from NMFS and the Department of Fisheries and Oceans Canada between the Gulf of St. Lawrence/Bay of Fundy/Scotian Shelf and Central Virginia (Hayes et al. 2022). The PBR for this stock is 851, and the estimated human-caused annual mortality and serious injury from 2015 to 2019 was 164 (Hayes et al. 2022). This species faces major anthropogenic effects because of its nearshore habitat. Historically, Greenland populations were hunted in large numbers for food and oil. Currently, they continue to suffer incidental mortality from Western North Atlantic fishing activities such as gillnets and bottom trawls (Hayes et al. 2022). Harbor porpoises also face threats from contaminants in their habitat, vessel traffic, habitat alteration due to offshore development, and climate-related shifts in prey distribution (Hayes et al. 2022).

Harbor porpoises belong to the HFC hearing group, which have lower acoustic thresholds for auditory injuries (NMFS 2018b), resulting in higher ranges to the thresholds relative to the other hearing groups and subsequently higher numbers of annual exposures for this species (JASCO 2022). Although the number of annual exposures is higher, they still do not exceed the annual PBR of 851 for this species (Hayes et al. 2022). As such, the risk of any population level consequences due to proposed Project-related noise is expected to be low. Harbor porpoises also face a risk of entanglement in fishing gear, which is primarily a result of ongoing, non-offshore wind activities; thus, the planned offshore wind projects would not contribute a substantial direct increase in risk for this species. The presence of structures may result in discarded fishing gear being caught around the foundations, creating an entanglement risk for this species. This risk notwithstanding, the presence of gear in the foundations is not likely to increase the number of injuries resulting from interactions above the PBR for harbor porpoise, and the reef effect from the presence of the structures would present a beneficial effect for this species (Mikkelsen et al. 2013).

### B.5.8 Seals

The species of seals potentially present in the proposed Project area include gray, harbor, and harp seals, none of which are listed under the ESA (Hayes et al. 2022). A UME was declared in June 2022 for harbor and gray seals; however, this UME is limited to seals stranding in Maine, and the cause of the strandings has been determined to be avian influenza rather than human interactions (NMFS 2022d). Human-caused IPFs that present risk to seal species include fisheries interactions and vessel strikes (Hayes et al. 2022), which are primarily a result of ongoing, non-offshore wind activities; thus, the planned offshore wind projects would not appreciably contribute to increased risk to these species. Furthermore, any potential increase in the risk of entanglement in fishing gear resulting from the presence of offshore wind structures would not exceed PBR for any seal species and would likely be offset by the beneficial effects of the reef effect (Arnould et al. 2015; Russell et al. 2014).

The total number of annual exposures estimated for these species for noise meeting or exceeding the auditory injury thresholds (JASCO 2022) is lower than the PBR for each species, indicating that risk of any consequences to the population due to proposed Project-related noise is low.

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# Appendix C
# Project Design Envelope and Maximum-Case Scenario

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## Table of Contents



## List of Tables

## Abbreviations and Acronyms

| | |
|---|---|
| BOEM | Bureau of Ocean Energy Management |
| cy | cubic yard |
| EIS | Environmental Impact Statement |
| ESP | electrical service platform |
| FAA | Federal Aviation Administration |
| ft | feet |
| $ft^2$ | square feet |
| $ft^3$ | cubic feet |
| kJ | kilojoule |
| kV | kilovolt |
| MLLW | mean lower low water |
| MW | megawatt |
| NA | not applicable |
| NEPA | National Environmental Policy Act |
| nm | nautical mile |
| OECC | offshore export cable corridor |
| PDE | Project design envelope |
| Project | New England Wind Project |
| WTG | wind turbine generator |

# C Project Design Envelope and Maximum-Case Scenario

Park City Wind, LLC (Park City Wind or the applicant) has developed a Project design envelope (PDE). A PDE approach allows Park City Wind to define and bracket proposed characteristics of the New England Wind Project (proposed Project) for environmental review and permitting while maintaining a reasonable degree of flexibility for selection and purchase of proposed Project components, such as wind turbine generators (WTG), foundations, submarine cables, and offshore substations.[1]

The Bureau of Ocean Energy Management (BOEM) uses the PDE concept to evaluate sufficiently detailed information within a reasonable range of parameters to analyze a “maximum-case scenario” within those parameters for each affected environmental resource. BOEM identified and verified that the maximum-case scenario for each resource based on the PDE provided by the applicant and analyzed in this Draft Environmental Impact Statement (EIS) could reasonably occur, if approved. This approach is intended to provide flexibility for lessees and allow BOEM to analyze environmental impacts in a manner that minimizes the need for subsequent environmental and technical reviews. In addition, the PDE approach enables BOEM to expedite review by beginning National Environmental Policy Act (NEPA) evaluations of Construction and Operations Plans before a lessee has finalized all of its design decisions.

This Draft EIS assesses the impacts of the reasonable range of designs that are described in the Construction and Operations Plan for the proposed Project 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, cultural, and socioeconomic resource. This Draft EIS considers the interrelationship between aspects of the PDE rather than simply independently viewing each design parameter. This Draft EIS also provides the analysis for the impacts of the maximum-case scenario alongside other reasonably foreseeable past, present, and future actions.

Certain resources evaluated in this Draft EIS could have multiple maximum-case scenarios, and the most impactful design parameters may not be the same for all resources. For example, larger WTGs (because they are taller) could be more impactful for visual aspects of cultural resources, whereas smaller WTGs (because there would be a greater number of foundations) could be more impactful on submerged landform features, which are also evaluated as cultural resources.

Tables C-1 and C-2 provide detailed information on the PDE for Phase 1, and Tables C-3 and C-4 provide detailed information on the PDE for Phase 2. Tables C-5 and C-6 provide detailed information on the PDE maximum-case scenario per resource used as part of the NEPA analysis for each phase.

[1] Additional information and guidance related to the PDE concept can be found here: https://www.boem.gov/Draft-Design-Envelope-Guidance/.

### Table C-1: Proposed Action Design Envelope Parameters—Phase 1

| Proposed Project Elements | Minimum | Maximum |
|---|---|---|
| **Capacity and Arrangement** | | |
| Wind facility capacity | Approximately 804 MW[a] | |
| Area of Phase 1 | 37,066 acres | 57,081 acres |
| **WTGs** | | |
| WTG foundation type envelope[b] | Up to 62 WTG foundations; All could be monopiles or jacket foundations | |
| Number of turbine positions[c] | | 62 |
| Number of turbines installed | 41 | 62 |
| Total tip height | | 1,171 ft MLLW[d] |
| Top of nacelle height[e] | | 725 ft MLLW[d] |
| Hub height | | 702 ft MLLW[d] |
| Rotor diameter | | 937 ft MLLW |
| Tip clearance | 89 ft MLLW[d] | |
| Tower diameter for WTG | 20 ft | 30 ft |
| **Monopile Foundations** | | |
| Diameter (at base) | | 39 ft |
| Pile footprint | | 1,195 $ft^2$ |
| Penetration | | 180 ft |
| Height between seabed and MLLW (water depth) | 141 ft | 180 ft |
| Transition piece length for WTG | | 148 ft |
| Transition piece length for ESP | | 131 ft |
| Transition piece tower diameter | | 30 ft |
| Monopile + transition piece/extended monopile length | | 466 ft |
| Number of piles/foundation | 1 | 1 |
| Number of piles driven/day within 24 hours[f] | 1 | 2 |
| Time per pile to drive | | Less than 6 hours |
| Hammer size | | 6,000 kJ |
| **Jacket (Pin Piles) Foundation** | | |
| Pile diameter for WTG and ESP (per pile) | | 13 ft |
| Pile footprint for WTG and ESP | | 140 $ft^2$ |
| Pile penetration for WTG and ESP | | 279 ft |
| Pile length for WTG and ESP | | 295 ft |
| Distance between legs for WTG | | 131 ft |
| Distance between legs for ESP | | 230 ft |
| Height between seabed and MLLW (water depth) | 141 ft | 180 ft |
| Jacket structure height for WTG and ESP | | 285 ft |
| Total height from interface/transition piece to below seafloor for WTG and ESP | | 564 ft |
| Transition piece width WTG | | 82 ft |
| Number of piles/foundation for WTG | 3 | 4 |
| Number of piles/foundation for ESP | 3 | 12 |
| Number of piles driven/day within 24 Hours[f] | 1 (up to 4 pin piles) | |
| Hammer size for WTG and ESP | | 3,500 kJ |
| **Scour Protection for Foundations** | | |
| Scour protection area at each monopile WTG and ESP | | 1.0 acres |
| Scour protection volume at each monopile WTG and ESP | | Up to 431,369 $ft^3$ |
| Scour protection area at each jacket WTG | | 1.1 acres |
| Scour protection volume at each jacket WTG | | Up to 489,885 $ft^3$ |
| Scour protection area at each jacket ESP | | 1.5 acres |
| Scour protection volume at each jacket ESP | | Up to 637,147 $ft^3$ |
| **ESP** | | |
| ESP foundation type envelope[bg] | Up to 2 ESP foundations Either could be monopile or jacket foundation | |
| Maximum topside dimensions | | 328 ft x 197 ft x 125 ft |
| Number of ESPs | 1 | 2 |
| Foundation type | Monopile | Jacket |

| Proposed Project Elements | Minimum | Maximum |
|---|---|---|
| Number of legs/foundation | 1 | 3 to 6 |
| Number of piles driven/foundation | 1 | 3 to 12 |
| Maximum topside height above MLLW | | 230 ft MLLW |
| **Inter-array and Inter-link Cable** | | |
| Inter-array cable voltage | 66 kV | 132 kV |
| Inter-array cable length | | 121 nm |
| Inter-link cable voltage | 66 kV | 275 kV |
| Inter-link cable length | | 11 nm |
| Protection method (total length of both cables) (rock placement, concrete mattresses, gabion rock bags, half-shell) | | Up to 2% |
| Target burial depth | 5 ft | 8 ft |
| **Export Cable** | | |
| Number of export cables within corridor | | 2 |
| Target burial depth | 5 ft | 8 ft |
| Export cables voltage | 220 kV | 275 kV |
| Maximum length of export cable (assuming 2 cables) | | 109 nm |
| Typical separation distance of export cable (assuming 2 cables) | 164 ft | 328 ft |
| Total corridor width for export cable (2 cables)[h] | 3,100 ft | 5,500 ft |
| Protection method (rock placement, concrete mattresses, gabion rock bags, half-shell) | | Up to 6% |
| Export cables dredging (width corridor per cable, bottom of trench) | | 50 ft |
| Export cables total dredging area | | Up to 52 acres |
| Export cables total dredging volume | | 176,300 cy |
| **Landfall and Onshore Components** | | |
| Landfall sites | Craigville Public Beach | Covell's Beach |
| Length of onshore cable | 4 miles | 6.5 miles |

cy = cubic yard; EIS = environmental impact statement; ESP = electrical service platform; FAA = Federal Aviation Administration; ft = feet; $ft^2$ = square feet; $ft^3$ = cubic feet; kJ = kilojoule; kV = kilovolt; MLLW = mean lower low water; MW = megawatt; NEPA = National Environmental Policy Act; nm = nautical mile; WTG = wind turbine generator

[a] The Proposed Action for Phase 1 is for an approximately 804 MW offshore wind energy project. This Draft EIS provides the evaluation of the potential impacts for a facility up to 804 MW to make sure adequate NEPA analysis for projects potentially constructed with a smaller capacity.

[b] The applicant would determine the number of each foundation type based on a future assessment of foundation feasibility (COP Volume I, Section 3.2.1.2.3; Epsilon 2022).

[c] Additional WTG positions allow for spare turbine locations or additional capacity to account for environmental or engineering challenges.

[d] Elevations relative to mean higher high water are approximately 3 ft lower than those relative to MLLW.

[e] The top of nacelle height dimension includes FAA lights and other appurtenances.

[f] Work would not be concurrently performed. No drilling is anticipated; however, it could be required if a large boulder or refusal is met. If drilling is required, a rotary drilling unit would be mobilized. Similarly, vibratory hammering could be used if deemed appropriate by the installation contractor.

[b] If two ESPs are used for Phase 1, each ESP could occupy one of the 130 WTG/ESP positions in the SWDA, or the two ESPs could be co-located at a single position, with each ESP's monopile foundation located within 250 feet of that position (i.e. the monopiles would be separated by up to 500 feet) (COP Volume I, Section 3.2.1.3; Epsilon 2022). As a result, Phase 1 could include 63 foundations at 62 WTG/ESP positions.

[h] This is the corridor width for siting purposes; each trench would be approximately 3.2 ft wide, and there would be an up to 3.3-to 6.6-foot-wide temporary disturbance zone from the tracks or skids of the cable installation.

**Table C-2: Design Parameters Consistent for All Phase 1 Scenarios**

| Proposed Project Element | Description |
|---|---|
| Orientation | WTGs and ESPs oriented in an east-to-west, north-to-south grid pattern with 1-nm spacing between WTG/ESP positions |
| Foundation construction method | Pile driving |
| Foundation and WTG installation vessel type | Jack-up vessel, anchored vessel, vessel on dynamic positioning, feeder barges/vessels |
| ESP installation vessel type | Jack-up vessel, anchored vessel, vessel on dynamic positioning, feeder barges/vessels |
| Inter-array and inter-link cable installation method (includes a pre-lay grapnel run and pre-lay survey) | Jet plowing, jet trenching, or mechanical plowing |
| Inter-array cable installation vessel type | Vessel on dynamic positioning, anchored vessel, self-propelled vessels, or feeder barges/vessels |
| Export cable corridor width[a] | Approximately 3,100–5,500 ft wide with cables typically being separated from each other and the Vineyard Wind 1 cables by a distance of 164–328 ft, although this distance could be further adjusted pending ongoing routing evaluation |
| Export cable installation method (includes a pre-lay grapnel run, pre-lay survey, and boulder clearance) | Jet plowing, jet trenching, or mechanical plowing, and possibly with dredging in some locations to achieve burial depth |
| Export cable installation vessel type | Vessel on dynamic positioning, anchored vessel, self-propelled vessels, or feeder barges/vessels |
| WTG coloring | RAL 9010 Pure White or RAL 7035 Light Grey |
| FAA obstruction lighting | Two synchronized L-864 aviation red flashing obstruction lights—WTG nacelle; 30 flashes per minute would be used for air navigation lighting (if the WTG's total tip height is 699 ft or greater, there would be at least three additional low-intensity L-810 flashing red lights at a point approximately midway between the top of the nacelle and sea level) |
| FAA obstruction lighting method | Aircraft detection lighting system automatically activate all FAA lights (see row above) when aircraft approach; alternatively, the proposed Project could use a system that automatically adjusts lighting intensity in response to visibility conditions |
| U.S. Coast Guard lighting | Yellow flashing lights on each WTG/ESP foundation visible from all directions |
| Navigational boating warning tools | Mariner radio activated sound signals and automatic identification system transponders |
| Landfall transition method | Horizontal directional drilling |
| Landfall transition | Underground concrete transition vaults |
| Onshore cable construction protection | Underground duct banks of high-density polyethylene or polyvinyl chloride pipes encased in concrete |
| Onshore substation | New onshore substation in the Town of Barnstable, Massachusetts would connect to the electric grid at Eversource's existing 345 kV West Barnstable Substation |

ESP = electrical service platform; FAA = Federal Aviation Administration; ft = feet; kV = kilovolt; nm = nautical mile; OECC = offshore export cable corridor; WTG = wind turbine generator

[a] Where the OECC travels through Lease Area OCS-A 0501, the width of the corridor could be narrower than 3,100 ft to avoid possible interference with Vineyard Wind 1's offshore facilities.

**Table C-3: Proposed Action Design Envelope Parameters—Phase 2**

| Proposed Project Elements | Minimum | Maximum |
|---|---|---|
| **Capacity and Arrangement** | | |
| Wind facility capacity | Approximately 1,232-1,725 MW[a] | |
| Area of Phase 2 | 54,857 acres | 74,873 acres |
| **WTGs** | | |
| WTG foundation and base type envelope[b] | Up to 88 foundations;<br>All could be monopiles, jacket, or bottom-frame foundations;<br>All jacket or bottom frame foundations could use piles or suction bucket bases | |
| Number of turbine positions[c] | | 88 |
| Number of turbines installed | 64 | 88 |
| Total tip height | | 1,171 ft MLLW[d] |
| Top of nacelle height[e] | | 725 ft MLLW[d] |
| Hub height | | 702 ft MLLW[d] |
| Rotor diameter | | 935 ft MLLW |
| Tip clearance | 89 ft MLLW[c] | |
| Tower diameter for WTG | | 33 ft |
| **Monopile Foundations** | | |
| Diameter (at base) | | 43 ft |
| Pile footprint | | 1,452 ft$^2$ |
| Penetration | | 180 ft |
| Height between seabed and MLLW (water depth) | 157 ft | 203 ft |
| Transition piece length WTG | | 164 ft |
| Transition piece length ESP | | 131 ft |
| Transition piece tower diameter WTG | | 33 ft |
| Monopile + transition piece/extended monopile length | | 482 ft |
| Number of piles/foundation | 1 | 1 |
| Number of piles driven/day within 24 hours[f] | 1 | 2 |
| Time per pile to drive | | Less than 6 hours |
| Hammer size | | 6,000 kJ |
| **Jacket Foundation – Pin Piles** | | |
| Diameter for WTG and ESP (per pile) | | 13 ft |
| Pile footprint for WTG and ESP (per pile) | | 140 ft$^2$ |
| Pile penetration for WTG and ESP | | 279 ft |
| Pile length for WTG and ESP | | 295 ft |
| Distance between legs for WTG | | 131 ft |
| Distance between legs for ESP | | 328 ft |
| Height between seabed and MLLW (water depth) | 157 ft | 203 ft |
| Jacket structure height for WTG and ESP | | 302 ft |
| Total height from interface/transition piece to below seafloor for WTG and ESP | | 581 ft |
| Transition piece width WTG | | 82 ft |
| Number of piles/foundation for WTG | 3 | 4 |
| Number of piles/foundation for ESP | 3 | 12 |
| Number of piles driven/day within 24 hours[f] | 1 (up to 4 pin piles) | |
| Hammer size for WTG and ESP | | 3,500 kJ |
| **Jacket Foundation – Suction Buckets** | | |
| Diameter for WTG and ESP (per suction) | | 49 ft |
| Suction footprint for WTG and ESP (per suction) | | 1,886 ft$^2$ |
| Suction penetration for WTG and ESP | | 49 ft |
| Bucket height for WTG and ESP | | 66 ft |
| Distance between legs for WTG | | 131 ft |
| Distance between legs for ESP | | 328 ft |
| Height between seabed and MLLW (water depth) | 157 ft | 203 ft |
| Jacket structure height for WTG and ESP | | 302 ft |

| Proposed Project Elements | Minimum | Maximum |
|---|---|---|
| Total height from interface/transition piece to below seafloor for WTG and ESP | | 351 ft |
| Transition piece width WTG | | 82 ft |
| Number of suction buckets/foundation for WTG | | 3 |
| Number of suction buckets/foundation for ESP | 3 | 6 |
| **Bottom-Frame WTG Foundation – Pin Piles** | | |
| Diameter per pile | | 13 ft |
| Footprint per pile | | 1,452 $ft^2$ |
| Penetration per pile | | 279 ft |
| Pile length | | 295 ft |
| Distance between legs | | 285 ft |
| Height between seabed and MLLW (water depth) | 157 ft | 203 ft |
| Bottom-frame height | | 302 ft |
| Total height from interface/transition piece to below seafloor | | 581 ft |
| Transition piece tower diameter | | 36 ft |
| Number of piles/foundation | | 3 |
| Number of piles driven/day within 24 hours[f] | 1 (up to 3 pin piles) | |
| Hammer size for WTG | | 6,000 kJ |
| **Bottom-Frame WTG Foundation – Suction Buckets** | | |
| Diameter per bucket | | 49 ft |
| Footprint per bucket | | 1,886 $ft^2$ |
| Penetration per bucket | | 49 ft |
| Bucket height | | 66 ft |
| Distance between legs | | 285 ft |
| Height between seabed and MLLW (water depth) | 157 ft | 203 ft |
| Bottom-frame height | | 302 ft |
| Total height from interface/transition piece to below seafloor | | 351 ft |
| Transition piece tower diameter | | 36 ft |
| Number of suction buckets/foundation | | 3 |
| **Scour Protection for Foundations** | | |
| Area at each monopile WTG | | Up to 1.2 acres |
| Volume at each monopile WTG | | Up to 504,424 $ft^3$ |
| Area at each jacket (pile) WTG | | Up to 1.1 acres |
| Volume at each jacket (pile) WTG | | Up to 487,344 $ft^3$ |
| Area at each jacket (suction bottom) WTG | | Up to 1.6 acres |
| Volume at each jacket (suction bottom) WTG | | Up to 514,856 $ft^3$ |
| Area at each bottom-frame (pile) WTG | | Up to 1.7 acres |
| Volume at bottom-frame (pile) WTG | | Up to 557,192 $ft^3$ |
| Area at each bottom-frame (suction bottom) WTG | | Up to 2.4 acres |
| Volume at each bottom-frame (suction bottom) WTG | | Up to 790,742 $ft^3$ |
| Area at each monopile ESP | | Up to 1.2 acres |
| Volume at each monopile ESP | | Up to 528,346 $ft^3$ |
| Area at each piled jacket ESP | | Up to 2.5 acres |
| Volume at each piled jacket ESP | | Up to 1,056,224 $ft^3$ |
| Area at each suction bucket jackets ESP | | Up to 5.3 acres |
| Volume at each suction bucket jackets ESP | | Up to 2,248,521 $ft^3$ |
| **ESP** | | |
| ESP foundation type envelope[bg] | Up to 3 ESP foundations;<br>Either could be monopile or jacket foundation | |
| Maximum topside dimensions | | 328 ft x 197 ft x 125 ft |
| Number of ESPs | 1 | 3 |
| Foundation type | Monopile | Jacket (pile or suction) |
| Number of legs/foundation | 1 | 3 to 6 |
| Number of piles driven/foundation (piled jacket) | 1 | 3 to 12 |
| Maximum topside height above MLLW | | 230 ft MLLW |
| **Inter-array and Inter-link Cable** | | |
| Inter-array cable voltage | 66 kV | 132 kV |

| **Proposed Project Elements** | **Minimum** | **Maximum** |
|---|---|---|
| Inter-array cable length | | 175 nm |
| Inter-link cable voltage | 66 kV | 345 kV |
| Inter-link cable length | | 32 nm |
| Protection method<br>(rock placement, concrete mattresses, gabion rock bags, half-shell) | | Up to 2% |
| Target burial depth | 5 ft | 8 ft |
| **Export Cable** | | |
| Number of export cables within corridor | 2 | 3 |
| Target burial depth | 5 ft | 8 ft |
| Export cables voltage | 220 kV | 345 kV |
| Maximum length of export cable (assuming 3 cables) | | 196 nm |
| Typical separation distance of export cable<br>(assuming 3 cables) | 164 ft | 328 ft |
| Total corridor width for export cable (3 cables)[h] | 3,100 ft | 5,500 ft |
| Protection method (rock placement, concrete mattresses, gabion rock bags, half-shell) | | Up to 6% |
| Export cables dredging (width corridor per cable) | | 50 ft |
| Export cables total dredging area | | Up to 67 acres |
| Export cables total dredging volume | | Up to 274,800 cy[3] |
| **Landfall and Onshore Components** | | |
| Landfall sites utilizing New England Wind OECC/Western Muskeget OECC Variant | Dowses Beach | Wianno Avenue |
| Length of onshore cable utilizing New England Wind OECC/Western Muskeget OECC Variant | | 10.6 mile |
| Landfall sites utilizing South Coast Variant OECC | Not specified | Not specified |
| Length of onshore cable utilizing South Coast OECC Variant | Not specified | Not specified |

cy = cubic yard; EIS = environmental impact statement; ESP = electrical service platform; FAA = Federal Aviation Administration; ft = feet; $ft^2$ = square feet; $ft^3$ = cubic feet; kJ = kilojoule; kV = kilovolt; MLLW = mean lower low water; MW = megawatt; NEPA = National Environmental Policy Act; nm = nautical mile; OECC = offshore export cable corridor; WTG = wind turbine generator

[a] The Proposed Action for Phase 2 is for an offshore wind energy project with generating capacity of at least 1,232 MW. Based on the number of WTG positions available and the assumed output per WTG of approximately 19.6 MW (based on the applicant's Phase 1 commitment to provide up to 804 MW through a minimum of 41 positions), this Draft EIS provides the evaluation of the potential impacts for a Phase 2 facility up to 1,725 MW (88 WTGs at 19.6 MW each) to provide adequate NEPA analysis for projects potentially constructed with a smaller capacity.

[b] The applicant would determine the number of each foundation type based on a future assessment of foundation feasibility (COP Volume I, Section 3.2.1.2.3; Epsilon 2022).

[c] Additional WTG positions allow for spare turbine locations or additional capacity to account for environmental or engineering challenges.

[d] Elevations relative to mean higher high water are approximately 3 ft lower than those relative to MLLW.

[e] The top of nacelle height dimension includes FAA lights and other appurtenances.

[f] Work would not be concurrently performed. No drilling is anticipated; however, it could be required if a large boulder or refusal is met. If drilling is required, a rotary drilling unit would be mobilized. Similarly, vibratory hammering could be used if deemed appropriate by the installation contractor.

[b] If two or three ESPs are used for Phase 2, each ESP could occupy one of the 130 WTG/ESP positions in the SWDA, or two of the ESPs could be co-located at a single position, with each ESP's monopile foundation located within 250 feet of that position (i.e. the monopiles would be separated by up to 500 feet). (COP Volume I, Section 4.2.1.3; Epsilon 2022). As a result, Phase 2 could include 89 foundations at 88 WTG/ESP positions.

[h] This is the corridor width for siting purposes; each trench would be approximately 3.2 ft wide, and there would be an up to 3.3-to 6.6-ft-wide temporary disturbance zone from the tracks or skids of the cable installation.

**Table C-4: Design Parameters Consistent for All Phase 2 Scenarios**

| Proposed Project Element | Description |
|---|---|
| Orientation | WTGs and ESPs oriented in an east-to-west, north-to-south grid pattern with 1-nm spacing between WTG/ESP positions |
| Foundation construction method | Pile driving |
| Foundation and WTG installation vessel type | Jack-up vessel, anchored vessel, vessel on dynamic positioning, feeder barges/vessels |
| ESP installation vessel type | Jack-up vessel, anchored vessel, vessel on dynamic positioning, feeder barges/vessels, specialized crane vessel |
| Inter-array and Inter-link cable installation method (includes a pre-lay grapnel run and pre-lay survey) | Jet plowing, jet trenching, or mechanical plowing |
| Inter-array cable installation vessel type | Vessel on dynamic positioning, anchored vessel, self-propelled vessels, or feeder barges/vessels |
| Export cable corridor width[a] | Approximately 3,100–5,500 ft wide with cables typically being separated from each other and the Phase 1 cables by a distance of 164–328 ft, although this distance could be further adjusted pending ongoing routing evaluation |
| Export cable installation method (includes a pre-lay grapnel run, pre-lay survey, and boulder clearance) | Jet plowing, jet trenching, or mechanical plowing, and possibly with dredging in some locations to achieve burial depth |
| Export cable installation vessel type | Vessel on dynamic positioning, anchored vessel, self-propelled vessels, or feeder barges/vessels |
| WTG coloring | RAL 9010 Pure White or RAL 7035 Light Grey |
| FAA obstruction lighting | One or two levels of L-864 aviation red flashing obstruction lights—WTG nacelle; flashes per minute would be determined in consultation with BOEM once Phase 2 proceeds (if the WTG's total tip height is 699 ft or greater, there would be at least three additional low-intensity L-810 flashing red lights at a point approximately midway between the top of the nacelle and sea level) |
| FAA obstruction lighting method | Aircraft detection lighting system automatically activate all FAA lights (see row above) when aircraft approach; alternatively, the proposed Project could use a system that automatically adjusts lighting intensity in response to visibility conditions |
| U.S. Coast Guard lighting | Yellow flashing lights on each WTG/ESP foundation visible from all directions |
| Navigational boating warning tools | Mariner radio activated sound signals and automatic identification system transponders |
| Landfall transition method | Horizontal directional drilling or open trenching |
| Landfall transition | Underground concrete transition vaults (one per export cable) |
| Onshore cable construction protection | Underground duct banks of high-density polyethylene or polyvinyl chloride pipes encased in concrete |
| Onshore substation | New onshore substation in the Town of Barnstable, Massachusetts would connect to the electric grid at Eversource's existing 345 kV West Barnstable Substation |

BOEM = Bureau of Ocean Energy Management; ESP = electrical service platform; FAA = Federal Aviation Administration; ft = feet; kV = kilovolt; nm = nautical mile; OECC = offshore export cable corridor; WTG = wind turbine generator

[a] Where the OECC travels through Lease Area OCS-A 0501, the width of the corridor could be narrower than 3,100 ft to avoid possible interference with Vineyard Wind 1's offshore facilities.

**Table C-5: Proposed Project Design Envelope Maximum-Case Scenario per Resource for Phase 1**

| Design Parameter | Air Quality | Water Quality | Benthic Resources | Birds | Bats | Coastal Habitats and Fauna | Finfish, Invertebrates, and Essential Fish Habitat | Marine Mammals and Sea Turtles | Wetlands and Waters of the United States | Commercial Fisheries and For-Hire Recreational Fishing | Cultural Resources | Demographics, Employment, Economics and Environmental Justice | Land Use and Coastal Infrastructure | Navigation and Vessel Traffic | Other Uses | Recreation and Tourism | Scenic and Visual Resources |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wind facility capacity (MW)[a] | 804 | 804 | 804 | 804 | 804 | 804 | 804 | 804 | 804 | 804 | 804 | 804 | 804 | 804 | 804 | 804 | 804 |
| WTG foundation arrangement envelope | NA | Evaluate both scenarios | Evaluate both scenarios | Evaluate both scenarios | Evaluate both scenarios | NA | Evaluate both scenarios | Evaluate both scenarios | Evaluate both scenarios | Evaluate both scenarios | Evaluate both scenarios | NA | NA | Evaluate both scenarios | NA | NA | Evaluate both scenarios |
| **WTGs and Foundation** | | | | | | | | | | | | | | | | | |
| Number of turbine positions[b] | 62 due to total number of trips required for construction | 62 due to total potential sediment disturbance, spills | 62 due to the total potential subsurface disturbance | 62 due to more potential for collision and more air space being occupied | 62 due to more potential for collision and more air space being occupied | NA | 62 due to more potential for loss of area and change of habitat | 62 due to more potential for noise and loss of area | 62 due to more potential for surface and subsurface disturbance | 62 due to more potential for collision and loss of area | 62 due to more potential effects on resources due to disturbance[c] | 62 due to more potential for noise and loss of area | NA | 62 due to more potential for collision/ allisions | 62 due to total number of potential hazards | 62 due to more potential for loss of area and change of habitat | 41 due to the total potential visual impact |
| Number of turbines installed | 62 | 62 | 62 | 62 | 62 | NA | 62 | 62 | 62 | 62 | 62 | 62 | NA | 62 | 62[c] | 62 | 62 |
| Tip height (MLLW)[d] | NA | NA | NA | 1,171 ft | 1, 171 ft | NA | NA | NA | NA | 1,171 ft | 1 171 ft | 1,171 ft | NA | 1,171 ft | 1,171 ft | 1,171 ft | 1,171 ft |
| Nacelle height (MLLW)[d, e] | NA | NA | NA | 725 ft | 725 ft | NA | NA | NA | NA | 725 ft | 725 ft | 725 ft | NA | 725 ft | 725 ft | 725 ft | 725 ft |
| Hub height (MLLW)[d] | NA | NA | NA | 702 ft | 702 ft | NA | NA | NA | NA | 702 ft | 702 ft | 702 ft | NA | 702 ft | 702 ft | 702 ft | 702 ft |
| Rotor diameter | NA | NA | NA | 935 ft | 935 ft | NA | NA | NA | NA | 935 ft | 935 ft | 935 ft | NA | 935 ft | 935 ft | 935 ft | 935 ft |
| Tip clearance (MLLW)[d] | NA | NA | NA | 89 ft | 89 ft | NA | NA | NA | NA | 89 ft | 89 ft | 89 ft | NA | 89 ft | 89 ft | 89 ft | 89 ft |
| Tower diameter for WTG | NA | 30 ft | NA | NA | NA | NA | NA | NA | NA | 30 ft | 30 ft | NA | NA | 30 ft | 30 ft | 30 ft | NA |
| **Monopile Foundation** | | | | | | | | | | | | | | | | | |
| Diameter | NA | 39 ft | 39 ft | 39 ft | 39 ft | NA | 39 ft | 39 ft | 39 ft | 39 ft | 39 ft | NA | NA | 39 ft | 39 ft | 39 ft | 39 ft |
| Pile footprint | NA | 1,195 ft$^2$ | 1,195 ft$^2$ | 1,195 ft$^2$ | 1,195 ft$^2$ | NA | 1,195 ft$^2$ | 1,195 ft$^2$ | 1,195 ft$^2$ | 1,195 ft$^2$ | 1,195 ft$^2$ | NA | NA | 1,195 ft$^2$ | 1,195 ft$^2$ | 1,195 ft$^2$ | NA |
| Penetration | NA | 180 ft | 180 ft | NA | NA | NA | 180 ft | 180 ft | NA | 180 ft | 180 ft | NA | NA | 180 ft | 180 ft | NA | NA |
| Height between seabed and MLLW (water depth) | NA | 180 ft | NA | 180 ft | NA | NA | NA | NA | 180 ft | 141 ft | 180 ft | NA | NA | 141 ft | 180 ft | 141 ft | 180 ft |
| Transition piece length WTG | NA | 148 ft | NA | 148 ft | NA | NA | NA | NA | 148 ft | 148 ft | 148 ft | NA | NA | 148 ft | 148 ft | 148 ft | 148 ft |
| Transition piece length ESP | NA | 131 ft | NA | 131 ft | NA | NA | NA | NA | 131 ft | 131 ft | 131 ft | NA | NA | 131 ft | 131 ft | 131 ft | 131 ft |
| Transition piece tower diameter | NA | 30 ft | NA | NA | NA | NA | NA | NA | NA | 30 ft | 30 ft | NA | NA | 30 ft | 30 ft | 30 ft | NA |
| Monopile + transition piece/extended monopile length | NA | 466 ft | NA | 466 ft | 466 ft | NA | NA | NA | 466 ft | 466 ft | 466 ft | NA | NA | 466 ft | 466 ft | 466 ft | 466 ft |
| Number of piles/foundation | NA | 1 | 1 | NA | NA | NA | 1 | 1 | 1 | 1 | 1 | NA | NA | 1 | 1 | 1 | 1 |
| Number of piles driven/day within 24 hours[f] | NA | 2 | 2 | NA | NA | NA | 2 | 2 | 2 | 2 | 2 | NA | NA | 2 | 2 | 2 | 2 |
| Hammer size for monopile foundation | NA | NA | 6,000 kJ | 6,000 kJ | NA | NA | 6,000 kJ | 6,000 kJ | NA | 6,000 kJ | NA | NA | NA | 6,000 kJ | 6,000 kJ | 6,000 kJ | NA |
| Scour protection area at each monopile WTG and ESP | NA | 1 acre | 1 acre | 1 acre | NA | NA | 1 acre | 1 acre | 1 acre | 1 acre | 1 acre | NA | NA | 1 acre | 1 acre | 1 acre | NA |
| Scour protection volume at each monopile WTG and ESP | NA | Up to 431,369 ft$^3$ | Up to 431,369 ft$^3$ | Up to 431,369 ft$^3$ | NA | NA | Up to 431,369 ft$^3$ | Up to 431,369 ft$^3$ | Up to 431,369 ft$^3$ | Up to 431,369 ft$^3$ | Up to 431,369 ft$^3$ | NA | NA | Up to 431,369 ft$^3$ | Up to 431,369 ft$^3$ | Up to 431,369 ft$^3$ | NA |

| Design Parameter | Air Quality | Water Quality | Benthic Resources | Birds | Bats | Coastal Habitats and Fauna | Finfish, Invertebrates, and Essential Fish Habitat | Marine Mammals and Sea Turtles | Wetlands and Waters of the United States | Commercial Fisheries and For-Hire Recreational Fishing | Cultural Resources | Demographics, Employment, Economics and Environmental Justice | Land Use and Coastal Infrastructure | Navigation and Vessel Traffic | Other Uses | Recreation and Tourism | Scenic and Visual Resources |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jacket (Pin Pile) Foundation** | | | | | | | | | | | | | | | | | |
| Diameter for WTG and ESP | NA | 13 ft | 13 ft | 13 ft | 13 ft | NA | 13 ft | 13 ft | 13 ft | 13 ft | 13 ft | NA | NA | 13 ft | 13 ft | 13 ft | 13 ft |
| Pile footprint for WTG and ESP | NA | 140 ft$^2$ | 140 ft$^2$ | 140 ft$^2$ | NA | NA | 140 ft$^2$ | 140 ft$^2$ | 140 ft$^2$ | 140 ft$^2$ | 140 ft$^2$ | NA | NA | 140 ft$^2$ | 140 ft$^2$ | NA | NA |
| Pile penetration for WTG and ESP | NA | 279 ft | 279 ft | 279 ft | NA | NA | 279 ft | 279 ft | 279 ft | 279 ft | 279 ft | NA | NA | 279 ft | 279 ft | NA | NA |
| Pile length for WTG and ESP | NA | 295 ft | 295 ft | 295 ft | NA | NA | 295 ft | 295 ft | 295 ft | 295 ft | 295 ft | NA | NA | 295 ft | 295 ft | NA | NA |
| Distance between legs for WTG | NA | 131 ft | 131 ft | 131 ft | NA | NA | 131 ft | 131 ft | 131 ft | 131 ft | 131 ft | NA | NA | 131 ft | 131 ft | NA | NA |
| Distance between legs for ESP | NA | 230 ft | 230 ft | 230 ft | NA | NA | 230 ft | 230 ft | 230 ft | 230 ft | 230 ft | NA | NA | 230 ft | 230 ft | NA | NA |
| Height between seabed and MLLW | NA | 180 ft | NA | 180 ft | NA | NA | NA | NA | 180 ft | 141 ft | 180 ft | NA | NA | 141 ft | 180 ft | 141 ft | 180 ft |
| Jacket structure height for WTG and ESP | NA | 285 ft | NA | 285 ft | 285 ft | NA | NA | NA | 285 ft | 285 ft | 285 ft | NA | NA | 285 ft | 285 ft | 285 ft | 285 ft |
| Total height from interface/transition piece to below seafloor for WTG and ESP | NA | 564 ft | NA | 564 ft | 564 ft | NA | NA | NA | 564 ft | 564 ft | 564 ft | NA | NA | 564 ft | 564 ft | 564 ft | 564 ft |
| Number of piles/foundation WTG | NA | 3 to 4 | 3 to 4 | 3 to 4 | NA | NA | 3 to 4 | 3 to 4 | 3 to 4 | 3 to 4 | 3 to 4 | NA | NA | 3 to 4 | 3 to 4 | 3 to 4 | 3 to 4 |
| Number of piles/foundation ESP | NA | 3 to 12 | 3 to 12 | 3 to 12 | NA | NA | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 | NA | NA | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 |
| Number of piles driven/day within 24 hours[f] | NA | 2 monopiles (up to 4 pin piles) | 2 monopiles (up to 4 pin piles) | 2 monopiles (up to 4 pin piles) | NA | NA | 2 monopiles (up to 4 pin piles) | 2 monopiles (up to 4 pin piles) | NA | 2 monopiles (up to 4 pin piles) | 2 monopiles (up to 4 pin piles) | NA | NA | 2 monopiles (up to 4 pin piles) | 2 monopiles (up to 4 pin piles) | 2 monopiles (up to 4 pin piles) | 2 monopiles (up to 4 pin piles) |
| Hammer size for jacket foundation | NA | NA | 3,500 kJ | 3,500 kJ | NA | NA | 3,500 kJ | 3,500 kJ | NA | 3,500 kJ | NA | NA | NA | 3,500 kJ | 3,500 kJ | 3,500 kJ | NA |
| Scour protection area at each jacket WTG | NA | 1.1 acres | 1.1 acres | 1.1 acres | NA | NA | 1.1 acres | 1.1 acres | 1.1 acres | 1.1 acres | 1.1 acres | NA | NA | 1.1 acres | 1.1 acres | 1.1 acres | NA |
| Scour protection volume at each jacket WTG | NA | Up to 489,885 ft$^3$ | Up to 489,885 ft$^3$ | Up to 489,885 ft$^3$ | NA | NA | Up to 489,885 ft$^3$ | Up to 489,885 ft$^3$ | Up to 489,885 ft$^3$ | Up to 489,885 ft$^3$ | Up to 489,885 ft$^3$ | NA | NA | Up to 489,885 ft$^3$ | Up to 489,885 ft$^3$ | Up to 489,885 ft$^3$ | NA |
| Scour protection area at each jacket ESP | NA | 1.5 acres | 1.5 acres | 1.5 acres | NA | NA | 1.5 acres | 1.5 acres | 1.5 acres | 1.5 acres | 1.5 acres | NA | NA | 1.5 acres | 1.5 acres | 1.5 acres | NA |
| Scour protection volume at each jacket ESP | NA | Up to 637,147 ft$^3$ | Up to 637,147 ft$^3$ | Up to 637,147 ft$^3$ | NA | NA | Up to 637,147 ft$^3$ | Up to 637,147 ft$^3$ | Up to 637,147 ft$^3$ | Up to 637,147 ft$^3$ | Up to 637,147 ft$^3$ | NA | NA | Up to 637,147 ft$^3$ | Up to 637,147 ft$^3$ | Up to 637,147 ft$^3$ | NA |
| **ESP** | | | | | | | | | | | | | | | | | |
| Maximum topside dimensions | NA | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | NA | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | NA | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | NA | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft |
| Number of ESPs | 2 ESPs due to total number of trips required for construction | 2 ESPs due to total potential sediment disturbance, spills | 2 ESPs due to total potential bottom disturbance | 2 ESPs due to more facilities occupying air and surface area | 2 ESPs due to more facilities occupying air and surface area | NA | 2 ESPs due to more facilities occupying air and surface area | 2 ESPs due to more facilities occupying air and surface area | 2 ESPs due to more facilities occupying surface area | 2 ESPs due to more facilities occupying air and surface area | 2 ESPs due to more facilities occupying air and surface area | 2 ESPs due to more facilities occupying air and surface area | NA | 2 ESPs due to more facilities occupying air and surface area | 2 ESPs due to more facilities occupying air and surface area | 2 ESPs due to more facilities occupying air and surface area | 2 ESPs due to more facilities occupying air and surface area |
| ESP foundation type | NA | Jacket | Jacket | Jacket | Jacket | NA | Jacket | Jacket | Jacket | Jacket | Jacket | Jacket | NA | Jacket | Jacket | Jacket | Jacket |

| Design Parameter | Air Quality | Water Quality | Benthic Resources | Birds | Bats | Coastal Habitats and Fauna | Finfish, Invertebrates, and Essential Fish Habitat | Marine Mammals and Sea Turtles | Wetlands and Waters of the United States | Commercial Fisheries and For-Hire Recreational Fishing | Cultural Resources | Demographics, Employment, Economics and Environmental Justice | Land Use and Coastal Infrastructure | Navigation and Vessel Traffic | Other Uses | Recreation and Tourism | Scenic and Visual Resources |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ESP number of piles/foundation | NA | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 | NA | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 | NA | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 |
| ESP maximum height (MLLW)[d] | NA | NA | NA | 230 ft | 230 ft | NA | NA | NA | NA | NA | NA | NA | NA | NA | 230 ft | NA | 230 ft |
| **Inter-Array and Inter-link Cable** | | | | | | | | | | | | | | | | | |
| Inter-array cable length | 121 nm | 121 nm | 121 nm | 121 nm | NA | 121 nm | 121 nm | 121 nm | 121 nm | 121 nm | 121 nm | 121 nm | NA | 121 nm | 121 nm | 121 nm | NA |
| Inter-link cable length | 11 nm | 11 nm | 11 nm | 11 nm | NA | 11 nm | 11 nm | 11 nm | 11 nm | 11 nm | 11 nm | 11 nm | NA | 11 nm | 11 nm | 11 nm | NA |
| Target burial depth | NA | 5 ft | 5 ft | NA | NA | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | NA |
| Protection method | NA | Up to 2% | Up to 2% | Up to 2% | NA | Up to 2% | Up to 2% | Up to 2% | Up to 2% | Up to 2% | Up to 2% | Up to 2% | NA | Up to 2% | Up to 2% | Up to 2% | NA |
| **Export Cable** | | | | | | | | | | | | | | | | | |
| Number of export cables | NA | 2 | 2 | NA | NA | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | NA |
| Burial depth | NA | 5 ft | 5 ft | NA | NA | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | NA |
| Maximum length of export cable (assuming 2 cables) | 109 nm | 109 nm | 109 nm | NA | NA | 109 nm | 109 nm | 109 nm | 109 nm | 109 nm | 109 nm | 109 nm | 109 nm | 109 nm | 109 nm | 109 nm | NA |
| Typical separation distance of export cable (assuming 2 cables) | NA | 328 ft | 328 ft | 328 ft | NA | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | NA |
| Total corridor width for export cable (assuming 2 cables)[g] | NA | 5,500 ft | 5,500 ft | NA | NA | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | NA |
| Export cables dredging (width corridor per cable) | NA | 50 ft | 50 ft | 50 ft | NA | 50 ft | 50 ft | 50 ft | 50 ft | 50 ft | 50 ft | NA | 50 ft | 50 ft | 50 ft | NA | NA |
| Export cables total dredging area | NA | Up to 67 acres | Up to 67 acres | Up to 67 acres | NA | Up to 67 acres | Up to 67 acres | Up to 67 acres | Up to 67 acres | Up to 67 acres | Up to 67 acres | NA | Up to 67 acres | Up to 67 acres | Up to 67 acres | NA | NA |
| Export cables total dredging volume | NA | 176,300 cy | 176,300 cy | 176,300 cy | NA | 176,300 cy | 176,300 cy | 176,300 cy | 176,300 cy | 176,300 cy | 176,300 cy | NA | 176,300 cy | 176,300 cy | 176,300 cy | NA | NA |
| Protection amount | NA | Up to 6% | Up to 6% | Up to 6% | NA | Up to 6% | Up to 6% | Up to 6% | Up to 6% | Up to 6% | Up to 6% | Up to 6% | Up to 6% | Up to 6% | Up to 6% | Up to 6% | NA |

cy = cubic yard; EIS = environmental impact statement; ESP = electrical service platform; FAA = Federal Aviation Administration; ft = feet; $ft^2$ = square feet; $ft^3$ = cubic feet; kJ = kilojoule; km = kilometer; MLLW = mean lower low water; MW = megawatt; NA = not applicable; NEPA = National Environmental Policy Act; nm = nautical mile; WTG = wind turbine generator

[a] The Proposed Action for Phase 1 is for an approximately 804 MW offshore wind energy project. This Draft EIS provides the evaluation for the potential impacts for a facility up to 804 MW to make sure adequate NEPA analysis for projects potentially constructed with a smaller capacity.

[b] Additional WTG positions allow for spare turbine locations or additional capacity to account for environmental or engineering challenges.

[c] For visual effects on cultural resources, as well as effects on aviation (Other Uses), the maximum-case scenario includes 41 of the tallest WTGs.

[d] Elevations relative to mean higher high water are approximately 3 ft lower than those relative to MLLW.

[e] The top of nacelle height dimension includes FAA lights and other appurtenances.

[f] Work would not be concurrently performed. No drilling is anticipated; however, it could be required if a large boulder or refusal is met. If drilling is required, a rotary drilling unit would be mobilized, or vibratory hammering would be used. Similarly, vibratory hammering could be used if deemed appropriate by the installation contractor.

[g] This is the corridor width for siting purposes; each trench would be approximately 3.2 feet wide, and there would be an up to 3.3- to 6.6-foot-wide temporary disturbance zone from the tracks or skids of the cable installation.

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**Table C-6: Proposed Project Design Envelope Maximum-Case Scenario per Resource for Phase 2**

| Design Parameter | Air Quality | Water Quality | Benthic Resources | Birds | Bats | Coastal Habitats and Fauna | Finfish, Invertebrates, and Essential Fish Habitat | Marine Mammals and Sea Turtles | Wetlands and Waters of the United States | Commercial Fisheries and For-Hire Recreational Fishing | Cultural Resources | Demographics, Employment, Economics and Environmental Justice | Land Use and Coastal Infrastructure | Navigation and Vessel Traffic | Other Uses | Recreation and Tourism | Scenic and Visual Resources |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wind facility capacity (MW)[a] | 1,796 | 1,796 | 1,796 | 1,796 | 1,796 | 1,796 | 1,796 | 1,796 | 1,796 | 1,796 | 1,796 | 1,796 | 1,796 | 1,796 | 1,796 | 1,796 | 1,796 |
| WTG foundation arrangement envelope | NA | NA | Evaluate all scenarios | Evaluate all scenarios | Evaluate all scenarios | NA | Evaluate all scenarios | Evaluate all scenarios | Evaluate all scenarios | Evaluate all scenarios | Evaluate all scenarios | NA | NA | Evaluate all scenarios | NA | NA | Evaluate all scenarios |
| **WTGs and Foundation** | | | | | | | | | | | | | | | | | |
| Number of turbine positions[b] | 88 due to total number of trips required for construction | 88 due to total potential sediment disturbance, spills | 88 due to the total potential subsurface disturbance | 88 due to more potential for collision and more air space being occupied | 88 due to more potential for collision and more air space being occupied | NA | 88 due to more potential for loss of area and change of habitat | 88 due to more potential for noise and loss of area | 88 due to more potential for surface and subsurface disturbance | 88 due to more potential for collision and loss of area | 88 due to more potential effects on resources due to disturbance[c] | 88 due to more potential for noise and loss of area | NA | 88 due to more potential for collision/ allisions | 88 due to total number of potential hazards | 88 due to more potential for loss of area and change of habitat | 41 due to the total potential visual impact |
| Number of turbines installed | 88 | 88 | 88 | 88 | 88 | NA | 88 | 88 | 88 | 88 | 88 | 88 | NA | 88 | 88[c] | 88 | 88 |
| Tip height (MLLW)[d] | NA | NA | NA | 1,171 ft | 1, 171 ft | NA | NA | NA | NA | 1,171 ft | 1,171 ft | 1,171 ft | NA | 1,171 ft | 1,171 ft | 1,171 ft | 1,171 ft |
| Nacelle height (MLLW)[d, e] | NA | NA | NA | 725 ft | 725 ft | NA | NA | NA | NA | 725 ft | 725 ft | 725 ft | NA | 725 ft | 725 ft | 725 ft | 725 ft |
| Hub height (MLLW)[d] | NA | NA | NA | 702 ft | 702 ft | NA | NA | NA | NA | 702 ft | 702 ft | 702 ft | NA | 702 ft | 702 ft | 702 ft | 702 ft |
| Rotor diameter | NA | NA | NA | 935 ft | 935 ft | NA | NA | NA | NA | 935 ft | 935 ft | 935 ft | NA | 935 ft | 935 ft | 935 ft | 935 ft |
| Tip clearance (MLLW)[d] | NA | NA | NA | 89 ft | 89 ft | NA | NA | NA | NA | 89 ft | 89 ft | 89 ft | NA | 89 ft | 89 ft | 89 ft | 89 ft |
| Tower diameter for WTG | NA | 30 ft | NA | NA | NA | NA | NA | NA | NA | 30 ft | 30 ft | NA | NA | 30 ft | 30 ft | 30 ft | NA |
| **Monopile Foundation** | | | | | | | | | | | | | | | | | |
| Diameter | NA | 43 ft | 43 ft | 43 ft | 43 ft | NA | 43 ft | 43 ft | 43 ft | 43 ft | 43 ft | NA | NA | 43 ft | 43 ft | 43 ft | 39 ft |
| Pile footprint | NA | 1,452 $ft^2$ | 1,452 $ft^2$ | 1,452 $ft^2$ | 1,452 $ft^2$ | NA | 1,452 $ft^2$ | 1,452 $ft^2$ | 1,452 $ft^2$ | 1,452 $ft^2$ | 1,452 $ft^2$ | NA | NA | 1,452 $ft^2$ | 1,452 $ft^2$ | 1,452 $ft^2$ | NA |
| Penetration | NA | 180 ft | 180 ft | NA | NA | NA | 180 ft | 180 ft | 180 ft | 180 ft | 180 ft | NA | NA | 180 ft | 180 ft | NA | NA |
| Height between seabed and MLLW (water depth) | NA | 203 ft | NA | 203 ft | NA | NA | NA | NA | 203 ft | 157 ft | 203 ft | NA | NA | 157 ft | 203 ft | 157 ft | 203 ft |
| Transition piece length WTG | NA | 164 ft | NA | 164 ft | NA | NA | NA | NA | 164 ft | 164 ft | 164 ft | NA | NA | 164 ft | 164 ft | 164 ft | 164 ft |
| Transition piece length ESP | NA | 131 ft | NA | 131 ft | NA | NA | NA | NA | 131 ft | 131 ft | 131 ft | NA | NA | 131 ft | 131 ft | 131 ft | 131 ft |
| Transition piece tower diameter | NA | 33 ft | NA | NA | NA | NA | NA | NA | NA | 33 ft | 33 ft | NA | NA | 33 ft | 33 ft | 33 ft | NA |
| Monopile + transition piece/extended monopile length | NA | 482 ft | NA | 482 ft | 482 ft | NA | NA | NA | 482 ft | 482 ft | 482 ft | NA | NA | 482 ft | 482 ft | 482 ft | 482 ft |
| Number of piles/foundation | NA | 1 | 1 | NA | NA | NA | 1 | 1 | 1 | 1 | 1 | NA | NA | 1 | 1 | 1 | 1 |
| Number of piles driven/day within 24 hours[f] | NA | 2 | 2 | NA | NA | NA | 2 | 2 | 2 | 2 | 2 | NA | NA | 2 | 2 | 2 | 2 |
| Hammer size for monopile foundation | NA | NA | 6,000 kJ | 6,000 kJ | NA | NA | 6,000 kJ | 6,000 kJ | NA | 6,000 kJ | NA | NA | NA | 6,000 kJ | 6,000 kJ | 6,000 kJ | NA |
| Scour protection area at each monopile WTG and ESP | NA | Up to 1.2 acres | Up to 1.2 acres | Up to 1.2 acres | NA | NA | Up to 1.2 acres | Up to 1.2 acres | Up to 1.2 acres | Up to 1.2 acres | Up to 1.2 acres | NA | NA | Up to 1.2 acres | Up to 1.2 acres | Up to 1.2 acres | NA |
| Scour protection volume at each monopile WTG and ESP | NA | Up to 504,424 $ft^3$ | Up to 504,424 $ft^3$ | Up to 504,424 $ft^3$ | NA | NA | Up to 504,424 $ft^3$ | Up to 504,424 $ft^3$ | Up to 504,424 $ft^3$ | Up to 504,424 $ft^3$ | Up to 504,424 $ft^3$ | NA | NA | Up to 504,424 $ft^3$ | Up to 504,424 $ft^3$ | Up to 504,424 $ft^3$ | NA |

| Design Parameter | Air Quality | Water Quality | Benthic Resources | Birds | Bats | Coastal Habitats and Fauna | Finfish, Invertebrates, and Essential Fish Habitat | Marine Mammals and Sea Turtles | Wetlands and Waters of the United States | Commercial Fisheries and For-Hire Recreational Fishing | Cultural Resources | Demographics, Employment, Economics and Environmental Justice | Land Use and Coastal Infrastructure | Navigation and Vessel Traffic | Other Uses | Recreation and Tourism | Scenic and Visual Resources |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jacket (Pin Pile) Foundation** | | | | | | | | | | | | | | | | | |
| Diameter for WTG and ESP | NA | 13 ft | 13 ft | 13 ft | 13 ft | NA | 13 ft | 13 ft | 13 ft | 13 ft | 13 ft | NA | NA | 13 ft | 13 ft | 13 ft | 13 ft |
| Pile footprint for WTG and ESP | NA | 140 $ft^2$ | 140 $ft^2$ | 140 $ft^2$ | NA | NA | 140 $ft^2$ | 140 $ft^2$ | 140 $ft^2$ | 140 $ft^2$ | 140 $ft^2$ | NA | NA | 140 $ft^2$ | 140 $ft^2$ | NA | NA |
| Pile penetration for WTG and ESP | NA | 279 ft | 279 ft | 279 ft | NA | NA | 279 ft | 279 ft | 279 ft | 279 ft | 279 ft | NA | NA | 279 ft | 279 ft | NA | NA |
| Pile length for WTG and ESP | NA | 295 ft | 295 ft | 295 ft | NA | NA | 295 ft | 295 ft | 295 ft | 295 ft | 295 ft | NA | NA | 295 ft | 295 ft | NA | NA |
| Distance between legs for WTG | NA | 131 ft | 131 ft | 131 ft | NA | NA | 131 ft | 131 ft | 131 ft | 131 ft | 131 ft | NA | NA | 131 ft | 131 ft | NA | NA |
| Distance between legs for ESP | NA | 328 ft | 328 ft | 328 ft | NA | NA | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | NA | NA | 230 ft | 230 ft | NA | NA |
| Height between seabed and MLLW | NA | 203 ft | NA | 203 ft | NA | NA | NA | NA | 203 ft | 157 ft | 203 ft | NA | NA | 157 ft | 203 ft | 157 ft | 203 ft |
| Jacket structure height for WTG and ESP | NA | 302 ft | NA | 302 ft | 302 ft | NA | NA | NA | 302 ft | 302 ft | 302 ft | NA | NA | 302 ft | 302 ft | 302 ft | 302 ft |
| Total height from interface/transition piece to below seafloor for WTG and ESP | NA | 581 ft | NA | 581 ft | 581 ft | NA | NA | NA | 581 ft | 581 ft | 581 ft | NA | NA | 581 ft | 581 ft | 581 ft | 581 ft |
| Number of piles/foundation WTG | NA | 3 to 4 | 3 to 4 | 3 to 4 | NA | NA | 3 to 4 | 3 to 4 | 3 to 4 | 3 to 4 | 3 to 4 | NA | NA | 3 to 4 | 3 to 4 | 3 to 4 | 3 to 4 |
| Number of piles/foundation ESP | NA | 3 to 12 | 3 to 12 | 3 to 12 | NA | NA | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 | NA | NA | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 |
| Number of piles driven/day within 24 hours[f] | NA | 1 (up to 4 pin piles) | 1 (up to 4 pin piles) | 1 (up to 4 pin piles) | NA | NA | 1 (up to 4 pin piles) | 1 (up to 4 pin piles) | 1 (up to 4 pin piles) | 1 (up to 4 pin piles) | 1 (up to 4 pin piles) | NA | NA | 1 (up to 4 pin piles) | 1 (up to 4 pin piles) | 1 (up to 4 pin piles) | 1 (up to 4 pin piles) |
| Hammer size for jacket foundation | NA | NA | 3,500 kJ | 3,500 kJ | NA | NA | 3,500 kJ | 3,500 kJ | NA | 3,500 kJ | NA | NA | NA | 3,500 kJ | 3,500 kJ | 3,500 kJ | NA |
| Scour protection area at each jacket WTG | NA | Up to 1.1 acres | Up to 1.1 acres | Up to 1.1 acres | NA | NA | Up to 1.1 acres | Up to 1.1 acres | Up to 1.1 acres | Up to 1.1 acres | Up to 1.1 acres | NA | NA | Up to 1.1 acres | Up to 1.1 acres | Up to 1.1 acres | NA |
| Scour protection volume at each jacket WTG | NA | Up to 487,344 $ft^3$ | Up to 487,344 $ft^3$ | Up to 487,344 $ft^3$ | NA | NA | Up to 487,344 $ft^3$ | Up to 487,344 $ft^3$ | Up to 487,344 $ft^3$ | Up to 487,344 $ft^3$ | Up to 487,344 $ft^3$ | NA | NA | Up to 487,344 $ft^3$ | Up to 487,344 $ft^3$ | Up to 487,344 $ft^3$ | NA |
| Scour protection area at each jacket ESP | NA | Up to 2.5 acres | Up to 2.5 acres | Up to 2.5 acres | NA | NA | Up to 2.5 acres | Up to 2.5 acres | Up to 2.5 acres | Up to 2.5 acres | Up to 2.5 acres | NA | NA | Up to 2.5 acres | Up to 2.5 acres | Up to 2.5 acres | NA |
| Scour protection volume at each jacket ESP | NA | Up to 1,056,224 $ft^3$ | Up to 1,056,224 $ft^3$ | Up to 1,056,224 $ft^3$ | NA | NA | Up to 1,056,224 $ft^3$ | Up to 1,056,224 $ft^3$ | Up to 1,056,224 $ft^3$ | Up to 1,056,224 $ft^3$ | Up to 1,056,224 $ft^3$ | NA | NA | Up to 1,056,224 $ft^3$ | Up to 1,056,224 $ft^3$ | Up to 1,056,224 $ft^3$ | NA |
| **Jacket Foundation – Suction Buckets** | | | | | | | | | | | | | | | | | |
| Diameter for WTG and ESP (per suction) | NA | 49 ft | 49 ft | 49 ft | 49 ft | NA | 49 ft | 49 ft | 49 ft | 49 ft | 49 ft | NA | NA | 49 ft | NA | 49 ft | 49 ft |
| Suction footprint for WTG and ESP (per suction) | NA | 1,886 $ft^2$ | 1,886 $ft^2$ | 1,886 $ft^2$ | NA | NA | 1,886 $ft^2$ | 1,886 $ft^2$ | 1,886 $ft^2$ | 1,886 $ft^2$ | 1,886 $ft^2$ | NA | NA | 1,886 $ft^2$ | 1,886 $ft^2$ | NA | NA |
| Suction penetration for WTG and ESP | NA | 49 ft | 49 ft | 49 ft | NA | NA | 49 ft | 49 ft | 49 ft | 49 ft | 49 ft | NA | NA | 49 ft | 49 ft | NA | NA |
| Bucket height for WTG and ESP | NA | 66 ft | 66 ft | 66 ft | NA | NA | 66 ft | 66 ft | 66 ft | 66 ft | 66 ft | NA | NA | 66 ft | 66 ft | NA | NA |
| Distance between legs for WTG | NA | 131 ft | 131 ft | 131 ft | NA | NA | 131 ft | 131 ft | 131 ft | 131 ft | 131 ft | NA | NA | 131 ft | 131 ft | NA | NA |
| Distance between legs for ESP | NA | 328 ft | 328 ft | 328 ft | NA | NA | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | NA | NA | 328 ft | 328 ft | NA | NA |
| Height between seabed and MLLW | NA | 203 ft | NA | 203 ft | NA | NA | NA | NA | 203 ft | 157 ft | 203 ft | NA | NA | 157 ft | 203 ft | 157 ft | 203 ft |

| Design Parameter | Air Quality | Water Quality | Benthic Resources | Birds | Bats | Coastal Habitats and Fauna | Finfish, Invertebrates, and Essential Fish Habitat | Marine Mammals and Sea Turtles | Wetlands and Waters of the United States | Commercial Fisheries and For-Hire Recreational Fishing | Cultural Resources | Demographics, Employment, Economics and Environmental Justice | Land Use and Coastal Infrastructure | Navigation and Vessel Traffic | Other Uses | Recreation and Tourism | Scenic and Visual Resources |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jacket structure height for WTG and ESP | NA | 302 ft | NA | 302 ft | 302 ft | NA | NA | NA | 302 ft | 302 ft | 302 ft | NA | NA | 302 ft | 302 ft | 302 ft | 302 ft |
| Total height from interface/transition piece to below seafloor for WTG and ESP | NA | 351 ft | NA | 351 ft | 351 ft | NA | NA | NA | 351 ft | 351 ft | 351 ft | NA | NA | 351 ft | 351 ft | 351 ft | 351 ft |
| Number of suction buckets/foundation for WTG | NA | 3 | 3 | 3 | NA | NA | 3 | 3 | 3 | 3 | 3 | NA | NA | 3 | 3 | 3 | 3 |
| Number of suction buckets/foundation for ESP | NA | 3 to 6 | 3 to 6 | 3 to 6 | NA | NA | 3 to 6 | 3 to 6 | 3 to 6 | 3 to 6 | 3 to 6 | NA | NA | 3 to 6 | 3 to 6 | 3 to 6 | 3 to 6 |
| Scour protection area at each jacket (suction bottom) WTG | NA | Up to 1.6 acres | Up to 1.6 acres | Up to 1.6 acres | NA | NA | Up to 1.6 acres | Up to 1.6 acres | Up to 1.6 acres | Up to 1.6 acres | Up to 1.6 acres | NA | NA | Up to 1.6 acres | Up to 1.6 acres | Up to 1.6 acres | NA |
| Scour protection volume at each jacket (suction bottom) WTG | NA | Up to 514,856 $ft^3$ | Up to 514,856 $ft^3$ | Up to 514,856 $ft^3$ | NA | NA | Up to 514,856 $ft^3$ | Up to 514,856 $ft^3$ | Up to 514,856 $ft^3$ | Up to 514,856 $ft^3$ | Up to 514,856 $ft^3$ | NA | NA | Up to 514,856 $ft^3$ | Up to 514,856 $ft^3$ | Up to 514,856 $ft^3$ | NA |
| Scour protection area at each suction bucket jackets ESP | NA | Up to 5.3 acres | Up to 5.3 acres | Up to 5.3 acres | NA | NA | Up to 5.3 acres | Up to 5.3 acres | Up to 5.3 acres | Up to 5.3 acres | Up to 5.3 acres | NA | NA | Up to 5.3 acres | Up to 5.3 acres | Up to 5.3 acres | NA |
| Scour protection volume at each suction bucket jackets ESP | NA | Up to 2,248,521 $ft^3$ | Up to 2,248,521 $ft^3$ | Up to 2,248,521 $ft^3$ | NA | NA | Up to 2,248,521 $ft^3$ | Up to 2,248,521 $ft^3$ | Up to 2,248,521 $ft^3$ | Up to 2,248,521 $ft^3$ | Up to 2,248,521 $ft^3$ | NA | NA | Up to 2,248,521 $ft^3$ | Up to 2,248,521 $ft^3$ | Up to 2,248,521 $ft^3$ | NA |
| **Bottom-Frame WTG Foundation – Pin Piles** | | | | | | | | | | | | | | | | | |
| Diameter per pile | NA | 13 ft | 13 ft | 13 ft | 13 ft | NA | 13 ft | 13 ft | 13 ft | 13 ft | 13 ft | NA | NA | 13 ft | 13 ft | 13 ft | 13 ft |
| Footprint per pile | NA | 1,452 $ft^2$ | 1,452 $ft^2$ | 1,452 $ft^2$ | NA | NA | 1,452 $ft^2$ | 1,452 $ft^2$ | 1,452 $ft^2$ | 1,452 $ft^2$ | 1,452 $ft^2$ | NA | NA | 1,452 $ft^2$ | 1,452 $ft^2$ | NA | NA |
| Penetration per pile | NA | 279 ft | 279 ft | 279 ft | NA | NA | 279 ft | 279 ft | 279 ft | 279 ft | 279 ft | NA | NA | 279 ft | 279 ft | NA | NA |
| Pile length | NA | 295 ft | 295 ft | 295 ft | NA | NA | 295 ft | 295 ft | 295 ft | 295 ft | 295 ft | NA | NA | 295 ft | 295 ft | NA | NA |
| Distance between legs | NA | 285 ft | 285 ft | 285 ft | NA | NA | 285 ft | 285 ft | 285 ft | 285 ft | 285 ft | NA | NA | 285 ft | 285 ft | NA | NA |
| Height between seabed and MLLW | NA | 203 ft | NA | 203 ft | NA | NA | NA | NA | 203 ft | 157 ft | 203 ft | NA | NA | 157 ft | 203 ft | 157 ft | 203 ft |
| Bottom-frame height | NA | 302 ft | NA | 302 ft | 302 ft | NA | NA | NA | 302 ft | 302 ft | 302 ft | NA | NA | 302 ft | 302 ft | 302 ft | 302 ft |
| Total height from interface/transition piece to below seafloor | NA | 581 ft | NA | 581 ft | 581 ft | NA | NA | NA | 581 ft | 581 ft | 581 ft | NA | NA | 581 ft | 581 ft | 581 ft | 581 ft |
| Number of piles/foundation | NA | 3 | 3 | 3 | NA | NA | 3 | 3 | 3 | 3 | 3 | NA | NA | 3 | 3 | 3 | 3 |
| Number of piles driven/day within 24 hours[f] | NA | 1 (up to 3 pin piles) | 1 (up to 3 pin piles) | 1 (up to 3 pin piles) | NA | NA | 1 (up to 3 pin piles) | 1 (up to 3 pin piles) | 1 (up to 3 pin piles) | 1 (up to 3 pin piles) | 1 (up to 3 pin piles) | NA | NA | 1 (up to 3 pin piles) | 1 (up to 3 pin piles) | 1 (up to 3 pin piles) | 1 (up to 3 pin piles) |
| Hammer size for WTG | NA | NA | 6,000 kJ | 6,000 kJ | NA | NA | 6,000 kJ | 6,000 kJ | NA | 6,000 kJ | NA | NA | NA | 6,000 kJ | 6,000 kJ | 6,000 kJ | NA |
| Scour protection area at each bottom-frame (pile) WTG | NA | Up to 1.7 acres | Up to 1.7 acres | Up to 1.7 acres | NA | NA | Up to 1.7 acres | Up to 1.7 acres | Up to 1.7 acres | Up to 1.7 acres | Up to 1.7 acres | NA | NA | Up to 1.7 acres | Up to 1.7 acres | Up to 1.7 acres | NA |
| Scour protection volume at each bottom-frame (pile) WTG | NA | Up to 557,192 $ft^3$ | Up to 557,192 $ft^3$ | Up to 557,192 $ft^3$ | NA | NA | Up to 557,192 $ft^3$ | Up to 557,192 $ft^3$ | Up to 557,192 $ft^3$ | Up to 557,192 $ft^3$ | Up to 557,192 $ft^3$ | NA | NA | Up to 557,192 $ft^3$ | Up to 557,192 $ft^3$ | Up to 557,192 $ft^3$ | NA |
| **Bottom-Frame WTG Foundation – Suction Buckets** | | | | | | | | | | | | | | | | | |
| Diameter per bucket | NA | 49 ft | 49 ft | 49 ft | 49 ft | NA | 49 ft | 49 ft | 49 ft | 49 ft | 49 ft | NA | NA | 49 ft | 49 ft | 49 ft | 49 ft |
| Footprint per bucket | NA | 1,886 $ft^2$ | 1,886 $ft^2$ | 1,886 $ft^2$ | NA | NA | 1,886 $ft^2$ | 1,886 $ft^2$ | 1,886 $ft^2$ | 1,886 $ft^2$ | 1,886 $ft^2$ | NA | NA | 1,886 $ft^2$ | 1,886 $ft^2$ | NA | NA |
| Penetration per bucket | NA | 49 ft | 49 ft | 49 ft | NA | NA | 49 ft | 49 ft | 49 ft | 49 ft | 49 ft | NA | NA | 49 ft | 49 ft | NA | NA |
| Bucket height | NA | 66 ft | 66 ft | 66 ft | NA | NA | 66 ft | 66 ft | 66 ft | 66 ft | 66 ft | NA | NA | 66 ft | 66 ft | NA | NA |

| Design Parameter | Air Quality | Water Quality | Benthic Resources | Birds | Bats | Coastal Habitats and Fauna | Finfish, Invertebrates, and Essential Fish Habitat | Marine Mammals and Sea Turtles | Wetlands and Waters of the United States | Commercial Fisheries and For-Hire Recreational Fishing | Cultural Resources | Demographics, Employment, Economics and Environmental Justice | Land Use and Coastal Infrastructure | Navigation and Vessel Traffic | Other Uses | Recreation and Tourism | Scenic and Visual Resources |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Distance between legs | NA | 285 ft | 285 ft | 285 ft | NA | NA | 285 ft | 285 ft | 285 ft | 285 ft | 285 ft | NA | NA | 285 ft | 285 ft | NA | NA |
| Height between seabed and MLLW | NA | 203 ft | NA | 203 ft | NA | NA | NA | NA | 203 ft | 157 ft | 203 ft | NA | NA | 157 ft | 157 ft | 157 ft | 203 ft |
| Bottom-frame height | NA | 302 ft | NA | 302 ft | 302 ft | NA | NA | NA | 302 ft | 302 ft | 302 ft | NA | NA | 302 ft | 302 ft | 302 ft | 302 ft |
| Total height from interface/transition piece to below seafloor | NA | 351 ft | NA | 351 ft | 351 ft | NA | NA | NA | 351 ft | 351 ft | 351 ft | NA | NA | 351 ft | 351 ft | 351 ft | 351 ft |
| Number of suction buckets/foundation | NA | 3 | 3 | 3 | NA | NA | 3 | 3 | 3 | 3 | 3 | NA | NA | 3 | 3 | 3 | 3 |
| Scour protection area at each bottom-frame (suction bottom) WTG | NA | Up to 2.4 acres | Up to 2.4 acres | Up to 2.4 acres | NA | NA | Up to 2.4 acres | Up to 2.4 acres | Up to 2.4 acres | Up to 2.4 acres | Up to 2.4 acres | NA | NA | Up to 2.4 acres | Up to 2.4 acres | Up to 2.4 acres | NA |
| Scour protection volume at each bottom-frame (suction bottom) WTG | NA | Up to 790,742 $ft^3$ | Up to 790,742 $ft^3$ | Up to 790,742 $ft^3$ | NA | NA | Up to 790,742 $ft^3$ | Up to 790,742 $ft^3$ | Up to 790,742 $ft^3$ | Up to 790,742 $ft^3$ | Up to 790,742 $ft^3$ | NA | NA | Up to 790,742 $ft^3$ | Up to 790,742 $ft^3$ | Up to 790,742 $ft^3$ | NA |
| **ESP** | | | | | | | | | | | | | | | | | |
| Maximum topside dimensions | NA | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | NA | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | NA | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft | 328 ft x 197 ft x 125 ft |
| Number of ESPs | 3 ESPs due to more facilities occupying air and surface area | 3 ESPs due to more facilities occupying air and surface area | 3 ESPs due to more facilities occupying air and surface area | 3 ESPs due to more facilities occupying air and surface area | 3 ESPs due to more facilities occupying air and surface area | NA | 3 ESPs due to more facilities occupying air and surface area | 3 ESPs due to more facilities occupying air and surface area | 3 ESPs due to more facilities occupying surface area | 3 ESPs due to more facilities occupying air and surface area | 3 ESPs due to more facilities occupying air and surface area | 3 ESPs due to more facilities occupying air and surface area | NA | 3 ESPs due to more facilities occupying air and surface area | 3 ESPs due to more facilities occupying air and surface area | 3 ESPs due to more facilities occupying air and surface area | 3 ESPs due to more facilities occupying air and surface area |
| ESP foundation type | NA | Jacket | Jacket | Jacket | Jacket | NA | Jacket | Jacket | Jacket | Jacket | Jacket | Jacket | NA | Jacket | Jacket | Jacket | Jacket |
| ESP number of piles/foundation | NA | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 | NA | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 | NA | 3 to 12 | 3 to 12 | 3 to 12 | 3 to 12 |
| ESP maximum height (MLLW)[c] | NA | NA | NA | 230 ft | 230 ft | NA | NA | NA | NA | NA | NA | NA | NA | NA | 230 ft | NA | 230 ft |
| **Inter-Array and Inter-link Cable** | | | | | | | | | | | | | | | | | |
| Inter-array cable length | NA | 175 nm | 175 nm | 175 nm | NA | 175 nm | 175 nm | 175 nm | 175 nm | 175 nm | 175 nm | 175 nm | NA | 175 nm | 175 nm | 175 nm | NA |
| Inter-link cable length | NA | 32 nm | 32 nm | 32 nm | NA | 32 nm | 32 nm | 32 nm | 32 nm | 32 nm | 32 nm | 32 nm | NA | 32 nm | 32 nm | 32 nm | NA |
| Target burial depth | NA | 5 ft | 5 ft | NA | NA | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | NA |
| Protection amount | NA | Up to 2% | Up to 2% | Up to 2% | NA | Up to 2% | Up to 2% | Up to 2% | Up to 2% | Up to 2% | Up to 2% | Up to 2% | NA | Up to 2% | Up to 2% | Up to 2% | NA |
| **Export Cable** | | | | | | | | | | | | | | | | | |
| Number of export cables | NA | 3 | 3 | NA | NA | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | NA |
| Burial depth | NA | 5 ft | 5 ft | NA | NA | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | 5 ft | NA |
| Maximum length of export cable (assuming 2 cables) | NA | 196 nm | 196 nm | NA | NA | 196 nm | 196 nm | 196 nm | 196 nm | 196 nm | 196 nm | 196 nm | 196 nm | 196 nm | 196 nm | 196 nm | NA |
| Typical separation distance of export cable (assuming 2 cables) | NA | 328 ft | 328 ft | 328 ft | NA | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | 328 ft | NA |
| Total corridor width for export cable (assuming 2 cables)[g] | NA | 5,500 ft | 5,500 ft | NA | NA | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | 5,500 ft | NA |
| Export cables dredging (width corridor per cable) | NA | 50 ft | 50 ft | 50 ft | NA | 50 ft | 50 ft | 50 ft | 50 ft | 50 ft | 50 ft | NA | 50 ft | 50 ft | 50 ft | NA | NA |

| Design Parameter | Air Quality | Water Quality | Benthic Resources | Birds | Bats | Coastal Habitats and Fauna | Finfish, Invertebrates, and Essential Fish Habitat | Marine Mammals and Sea Turtles | Wetlands and Waters of the United States | Commercial Fisheries and For-Hire Recreational Fishing | Cultural Resources | Demographics, Employment, Economics and Environmental Justice | Land Use and Coastal Infrastructure | Navigation and Vessel Traffic | Other Uses | Recreation and Tourism | Scenic and Visual Resources |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Export cables total dredging area | NA | Up to 73 acres | Up to 73 acres | Up to 73 acres | NA | Up to 73 acres | Up to 73 acres | Up to 73 acres | Up to 73 acres | Up to 73 acres | Up to 73 acres | NA | Up to 73 acres | Up to 73 acres | Up to 73 acres | NA | NA |
| Export cables total dredging volume | NA | 274,800 cy | 274,800 cy | 274,800 cy | NA | 274,800 cy | 274,800 cy | 274,800 cy | 274,800 cy | 274,800 cy | 274,800 cy | NA | 274,800 cy | 274,800 cy | 274,800 cy | NA | NA |
| Protection amount | NA | Up to 6% | Up to 6% | Up to 6% | NA | Up to 6% | Up to 6% | Up to 6% | Up to 6% | Up to 6% | Up to 6% | Up to 6% | Up to 6% | Up to 6% | Up to 6% | Up to 6% | NA |

cy = cubic yard; EIS = environmental impact statement; ESP = electrical service platform; FAA = Federal Aviation Administration; ft = feet; $ft^2$ = square feet; $ft^3$ = cubic feet; kJ = kilojoule; MLLW = mean lower low water; MW = megawatt; NA = not applicable; NEPA = National Environmental Policy Act; nm = nautical mile; WTG = wind turbine generator

[a] The Proposed Action for Phase 2 is for an approximately 1,200-1,500 MW offshore wind energy project. This Draft EIS provides the evaluation for the potential impacts for a facility up to 1,500 MW to make sure adequate NEPA analysis for projects potentially constructed with a smaller capacity.

[b] Additional WTG positions allow for spare turbine locations or additional capacity to account for environmental or engineering challenges.

[c] For visual effects on cultural resources, as well as effects on aviation (Other Uses), the maximum-case scenario includes 41 of the tallest WTGs.

[d] Elevations relative to mean higher high water are approximately 3 ft lower than those relative to MLLW.

[e] The top of nacelle height dimension includes FAA lights and other appurtenances.

[f] Work would not be concurrently performed. No drilling is anticipated; however, it may be required if a large boulder or refusal is met. If drilling is required, a rotary drilling unit would be mobilized. Similarly, vibratory hammering could be used if deemed appropriate by the installation contractor.

[g] This is the corridor width for siting purposes; each trench would be approximately 3.2 feet wide and there would be an up to 3.3- to 6.6-foot-wide temporary disturbance zone from the tracks or skids of the cable installation.

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# Appendix D
# Geographical Analysis Areas

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## Table of Contents



## List of Tables



## Abbreviations and Acronyms

| | |
|---|---|
| BOEM | Bureau of Ocean Energy Management |
| EIS | Environmental Impact Statement |
| LME | large marine ecosystem |
| OECC | offshore export cable corridor |
| OECR | onshore export cable route |
| RI/MA Lease Areas | Rhode Island and Massachusetts Lease Areas |
| SWDA | Southern Wind Development Area |
| WTG | wind turbine generator |

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# D Geographical Analysis Areas

Each resource has a geographic distribution and area in which proposed Project impacts would be felt. This appendix describes the geographic analysis area for each resource evaluated in the Draft Environmental Impact Statement (Table D-1).

**Table D-1: Resource-Specific Geographic Analysis Areas**

| Resource | Geographic Analysis Area |
|---|---|
| Air Quality | The geographic analysis area for air quality includes the airshed within 15.5 miles of the SWDA, OECC, OECR, substation sites, and ports potentially used for construction or operations. Given the generally low emissions of the sea vessels and equipment that would be used during proposed construction activities, any potential air quality impacts would likely be within a few miles of the source. BOEM selected the 15.5-mile distance to provide a reasonable buffer. |
| Water Quality | The offshore geographic analysis area for water quality extends for a 10-mile radius around the SWDA, the OECC, and vessel approach routes to port facilities that would be used by the proposed Project. This area accounts for some transport of water masses due to ocean currents. Onshore, the water quality geographic analysis area includes the proposed Project footprint and surrounding areas. |
| Bats | While some historic, anecdotal observations of bats up to 1,212 miles offshore of North America exist, recent offshore observations of tree bats range from 10.5 to 26 miles (Hatch et al. 2013). As such, the geographic analysis area for bats encompasses more than 193 million acres and includes the U.S. East Coast, from Maine to Florida, to capture migratory species and extends 100 miles offshore and 5 miles inland to capture the migratory movements of most species in this group. Cave bats do not typically occur on the Outer Continental Shelf. Tree bats are long-distance migrants whose ranges include the majority of the Atlantic coast from Florida to Maine. While these species have been documented traversing the open ocean and have the potential to encounter WTGs, use of offshore habitat is thought to be limited and generally restricted to spring and fall migration. The onshore limit of the geographic scope is intended to cover a majority of the onshore habitat use by those species that may encounter the proposed Project during the majority of their life cycle. |
| Benthic Resources | The geographic analysis area for benthic resources extends for a 10-mile radius around the SWDA and the OECC. This area is based on where the most widespread impact (namely, suspended sediment) from the proposed Project could affect benthic resources. While sediment transport beyond this radius is possible, sediment transport related to the proposed activities is likely to remain within this area, according to the results of the model presented in the Construction and Operations Plan (Appendix III-A; Epsilon 2022). Highly mobile benthic animals and planktonic life stages of otherwise benthic organisms may be affected by activities outside of this area and are, therefore, considered among the resources discussed in the Environmental Impact Statement. |
| Birds | The geographic analysis area for birds encompasses more than 193 million acres and includes the U.S. East Coast, from Maine to Florida, covering migratory species that may encounter the proposed Project and use habitats along these states. The offshore limit is 100 miles from the Atlantic shore to capture the migratory movements of most species in this group. The onshore limit is 0.5 mile inland to cover onshore habitats used by the 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. |
| Coastal Habitats and Fauna | The geographic analysis area for coastal habitats and fauna is defined as all lands and waters that are within a 1-mile buffer of the OECC and fall within the 3-nautical-mile (3.5-mile) seaward limit of Massachusetts' territorial sea to 100 feet landward of the first major land transportation route encountered (a road, highway, rail line, etc.). |

<table>
<tr><th>Resource</th><th>Geographic Analysis Area</th></tr>
<tr><td>Finfish, Invertebrates, and Essential Fish Habitat</td><td>The geographic analysis area for finfish, invertebrates, and essential fish habitat is the southern New England sub-region of the Northeast Shelf LME, which is likely to capture the majority of the movement range for most species in this group. The geographic analysis area extends from the southern edge of the Scotian Shelf (in the Gulf of Maine) to Cape Hatteras, North Carolina.</td></tr>
<tr><td>Marine Mammals</td><td>The geographic analysis area for marine mammals encompasses more than 384 million acres and includes the Scotian Shelf, Northeast Shelf, and Southeast Shelf LMEs, which are likely to capture the majority of the movement range for most species in this group. LMEs are delineated based on ecological criteria including bathymetry, hydrography, productivity, and trophic relationships among populations of marine species, and the National Oceanic and Atmospheric Administration uses them as the basis for ecosystem-based management. The Northeast Shelf LME extends from the southern edge of the Scotian Shelf (in the Gulf of Maine) to Cape Hatteras, North Carolina, and the Southeast Shelf LME extends from the Straits of Florida to Cape Hatteras, North Carolina. These LMEs extend from the coastline offshore to the shelf break (at a depth of approximately 328 to 656 feet).</td></tr>
<tr><td>Sea Turtles</td><td>The geographic analysis area for sea turtles encompasses nearly 241 million acres and includes the Scotian Shelf, Northeast Shelf, and Southeast Shelf LMEs, which are likely to capture the majority of the movement range within U.S. waters for most species in this group. LMEs are delineated based on ecological criteria including bathymetry, hydrography, productivity, and trophic relationships among populations of marine species, and the National Oceanic and Atmospheric Administration uses them as the basis for ecosystem-based management. The Northeast Shelf LME extends from the southern edge of the Scotian Shelf (in the Gulf of Maine) to Cape Hatteras, North Carolina, and the Southeast Shelf LME extends from the Straits of Florida to Cape Hatteras, North Carolina. These LMEs extend from the coastline offshore to the shelf break (at a depth of approximately 328 to 656 feet). The geographic analysis area of nesting for all turtle species ranges from North Carolina southward.</td></tr>
<tr><td>Terrestrial Habitats and Fauna</td><td>The geographic analysis area for terrestrial habitats and fauna is defined as all land areas that would be disturbed by the proposed Project, plus a 0.5-mile buffer. This discussion of terrestrial habitats and fauna does not include bats, which are discussed separately under EIS Section G.2.3, Bats, or coastal and marine birds, which are discussed separately under EIS Section G.2.4, Birds.</td></tr>
<tr><td>Wetlands and Other Waters of the United States</td><td>The geographic analysis area for wetlands and other waters of the U.S. includes onshore development areas within the Cape Cod watershed (hydrologic unit code 0109000202), as well as open ocean areas within the U.S. Army Corps of Engineers’ jurisdiction. Under Section 404 of the Clean Water Act, the USACE regulates the discharge of dredged or fill material into waters of the U.S. The limits of USACE jurisdiction in non-tidal waters (33 CFR § 328.4) are as follows:<ul><li>In the absence of adjacent wetlands, the jurisdiction extends to the ordinary high water mark; or when adjacent wetlands are present, the jurisdiction extends beyond the ordinary high water mark to the limit of the adjacent wetlands.</li><li>When the waters of the U.S. consist only of wetlands, the jurisdiction extends to the limit of the wetland.</li></ul>In addition, under Section 10 of the Rivers and Harbors Act of 1899, the USACE regulates construction of any structure and work that are located in or that affect "navigable waters of the U.S." from the mean high water mark to the seaward limit of the Outer Continental Shelf (43 USC 1333[e] and 33 CFR 320.2).<br><br>To avoid duplication of analysis, the evaluation of impacts on wetlands and waters of the U.S. focuses only on non-tidal waters and wetlands. Impacts on tidal waters and wetlands, including all U.S. Army Corps of Engineers jurisdictional waters and wetlands from the high tide line to the 3-nautical-mile (3.5-mile) limit of territorial seas are discussed in EIS Section 3.5, Coastal Habitats and Fauna. Existing conditions and impacts for open waters from the limits of territorial seas to the edge of the U.S. exclusive economic zone are discussed in EIS Section G.2.2, Water Quality, as well as other resource sections related to open water environments.</td></tr>
<tr><td>Commercial Fisheries and For-Hire Recreational Fishing</td><td>The geographic analysis area for commercial fisheries and for-hire recreational fishing encompasses nearly 199 million acres The area is the boundary of the management area of the New England Fishery Management Council and the Mid-Atlantic Fishery Management Council for all federal fisheries within the U.S. exclusive economic zone (from 3 to 200 nautical miles [3.5 to 230 miles] from the coastline) through Cape Hatteras, North Carolina, plus the state waters of the Commonwealth of Massachusetts (from 0 to 3 nautical miles [0 to 3.5 miles] from the coastline). For an analysis of private recreational fishing, see EIS Section 3.15, Recreation and Tourism.</td></tr>
</table>

| Resource | Geographic Analysis Area |
|---|---|
| Cultural Resources | The geographic analysis area for cultural resources consists of the direct and indirect areas of potential effect, as well as the locations of known or planned future offshore wind development off the coast of Cape Cod, Nantucket, and Martha's Vineyard. For visually affected cultural resources, the geographic analysis area is limited to the viewshed area of intervisibility for the proposed Project and other future offshore wind projects within the geographic analysis area for cultural resources. For all other cultural resources, the geographic analysis area is limited to the proposed Project's terrestrial land and seafloor disturbance. As a result, the geographic analysis area for cultural resources is defined as follows:<br>• The depth and breadth of the seabed potentially affected by any bottom-disturbing activities associated with the construction, including, but not limited to, the WTGs, offshore export cables, and support facilities, as well as areas that could be impacted by associated activities such as dredging, deploying and moving vessel anchors, and temporary or permanent construction or staging areas;<br>• The depth and breadth of terrestrial areas potentially affected by ground-disturbing activities associated with construction of onshore infrastructure such as export cables, transmission lines, electrical substations, port expansions, and temporary or permanent construction or staging areas; and<br>• The area of intervisibility between the viewshed from which structures from the proposed Project would be visible and the viewshed from which structures would be visible from planned offshore wind developments. The analysis of cumulative visual impacts is applied only to those historic properties that are adversely affected by the proposed Project and that have a view of other planned offshore wind developments. |
| Demographics, Employment, and Economics | The geographic analysis area for demographics, employment, and economics includes the counties where proposed onshore infrastructure and potential port cities are located, as well as the counties in closest proximity to the SWDA (Barnstable, Bristol, Dukes, and Nantucket counties, Massachusetts; and Providence and Washington counties, Rhode Island). These counties are the most likely to experience beneficial or adverse economic impacts from the proposed Project. |
| Environmental Justice | The geographic analysis area for environmental justice includes the counties where proposed onshore infrastructure and potential port cities are located, as well as counties in closest proximity to the SWDA (Barnstable, Bristol, Dukes, and Nantucket counties, Massachusetts; and Providence and Washington counties, Rhode Island). These counties, and environmental justice communities located within them, are the most likely to experience economic impacts from the proposed Project. |
| Land Use and Coastal Infrastructure | The geographic analysis area for land use and coastal infrastructure includes Barnstable and Bristol counties, as well as counties containing ports potentially used for the proposed Project's construction, operations, and decommissioning. These areas encompass more than 5.6 million acres in locations where direct and indirect impacts associated with proposed onshore facilities and ports would occur. |
| Navigation and Vessel Traffic | The geographic analysis area for navigation and vessel traffic extends for a 7.5-mile radius around the SWDA, the OECC, and vessel approach routes to the ports of New Bedford, Montauk, and Brayton Point in Bristol County, Massachusetts; Port of Providence in Providence County, Rhode Island; and the Port of Davisville (Quonset Point) in Washington County, Rhode Island. These ports have been identified as suitable to support the offshore wind industry in Massachusetts and Rhode Island. |
| Other Uses | The geographic analysis area for other uses (national security and military use, aviation and air traffic, offshore cables and pipelines, radar systems, scientific research and surveys, and marine minerals) is described below. BOEM is not analyzing the impacts of future offshore wind energy on marine minerals extraction because the proposed Project would have no impacts on marine minerals extraction and could not contribute to cumulative impacts on marine minerals extraction. In addition, BOEM assumes that export cables associated with future offshore wind projects within the RI/MA Lease Areas would avoid identified borrow areas because BOEM would consult with the BOEM Marine Minerals Program and the U.S. Army Corps of Engineers before approving offshore wind cable routes, avoiding impacts on known borrow areas.<br>**Military and national security uses**: The geographic analysis area includes airspace, surface, and submarine areas that are used by regional military entities in an area roughly bounded by Montauk, New York; Providence, Rhode Island; Provincetown, Massachusetts; and within a 10-mile buffer from the RI/MA Lease Areas.<br>**Aviation and air traffic:** The geographic analysis area includes airspace and airports used by regional air traffic, generally 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 Lease Areas. |

| Resource | Geographic Analysis Area |
|---|---|
| | **Offshore energy:** The geographic analysis area includes the nine active offshore RI/MA Lease Areas. BOEM is not analyzing the impacts of future offshore wind energy on offshore energy but is analyzing the impact of the proposed Project on offshore energy. Therefore, the analysis of these impacts is limited to sections on the proposed Project.<br><br>**Cables and pipelines:** The geographic analysis area includes areas within 1 mile of the OECC and SWDA and the RI/MA Lease Areas that could affect future siting or operation of cables and pipelines.<br><br>**Radar systems:** The geographic analysis area is the same as that identified for aviation and air traffic and includes airspace and airports used by regional air traffic, generally 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 Lease Areas.<br><br>**Scientific research and surveys**: The geographic analysis area is the same as for finfish, invertebrates, and essential fish habitat and includes the footprint of the proposed Project and all planned projects (as outlined on Figure 3.6-1) between Maine and mid-North Carolina. |
| Recreation and Tourism | The geographic analysis area for recreation and tourism includes the Massachusetts counties containing OECR infrastructure (Barnstable County for Phases 1 and 2, as well as Bristol County for the Phase 2 South Coast Variant onshore routing envelope); the City of Bridgeport, Connecticut, where the operations base would be located; and the geographic analysis area for scenic and visual resources, which generally consists of a 46-mile radius from all proposed Project WTG positions, as well as land areas within view of the proposed onshore substation sites. This radius is the area from which any portion of the proposed Project facilities would potentially be visible, as well as important recreational vessel ports potentially affected by the proposed Project. |
| Scenic and Visual Resources | The geographic analysis area for scenic and visual resources consists of a 46-mile radius from all proposed Project WTG positions, as well as land areas within view of the proposed onshore substation sites. This radius is the area from which any portion of the proposed Project facilities would potentially be visible, based on a maximum WTG rotor tip height of 1,171 feet above mean sea level, when considering only the obscuring effect of the curvature of the earth's surface and the height of the tops of WTG nacelles (where Federal Aviation Administration aviation hazard lighting would be mounted) of 725 feet above mean sea level. The onshore geographic analysis area does not include the OECR and OECC landfall sites because those components would be installed underground. |

BOEM = Bureau of Ocean Energy Management; EIS = Environmental Impact Statement; LME = large marine ecosystem; OECC = offshore export cable corridor; OECR = onshore export cable route; RI/MA Lease Areas = Rhode Island and Massachusetts Lease Areas; SWDA = Southern Wind Development Area; WTG = wind turbine generator

## D.1 References

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# Appendix E
# Planned Activities Scenario

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## Table of Contents



## List of Tables



## List of Figures

## Abbreviations and Acronyms

| | |
|---|---|
| ASMFC | Atlantic States Marine Fisheries Commission |
| BOEM | Bureau of Ocean Energy Management |
| CECP | Clean Energy and Climate Plan |
| CES | Comprehensive Energy Strategy |
| CFR | Code of Federal Regulations |
| COP | Construction and Operations Plan |
| DEEP | Department of Energy and Environmental Protection |
| EIS | Environmental Impact Statement |
| ESA | Endangered Species Act |
| ESP | electrical service platform |
| FAA | Federal Aviation Administration |
| FERC | Federal Energy Regulatory Commission |
| GC3 | Governor's Council on Climate Change |
| GHG | greenhouse gas |
| GW | gigawatt |
| IPF | impact-producing factor |
| IRP | Integrated Resource Plan |
| LNG | liquified natural gas |
| MARAD | U.S. Department of Transportation Maritime Administration |
| MassCEC | Massachusetts Clean Energy Center |
| MCT | Marine Commerce Terminal |
| MLLW | mean lower low water |
| MMPA | Marine Mammal Protection Act |
| MW | megawatt |
| NEFSC | Northeast Fisheries Science Center |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| NYSERDA | New York State Energy Research and Development Authority |
| OCS | Outer Continental Shelf |
| RI/MA Lease Areas | Rhode Island and Massachusetts Lease Areas |
| RITE | Roosevelt Island Tidal Energy |
| SAP | Site Assessment Plan |
| SWDA | Southern Wind Development Area |
| TBD | to be determined |
| USACE | U.S. Army Corps of Engineers |
| USC | U.S. Code |
| USCG | U.S. Coast Guard |
| WTG | wind turbine generator |

# E Planned Activities Scenario

## E.1 Introduction

The impacts resultant from the planned activities scenario are the incremental impacts of the Proposed Action on the environment added to other reasonably foreseeable planned activities in the area (Code of Federal Regulations, Title 40, Section 1502.15 [40 CFR § 1502.15]).[1] This appendix discusses resource-specific planned activities that could occur if the Proposed Action's impacts occur in the same location and timeframe as impacts from other reasonably foreseeable planned activities. Specifically, the Proposed Action here is the construction and installation (construction), operations and maintenance (operations), and conceptual decommissioning (decommissioning) of the New England Wind Project (proposed Project), a wind energy project that would occupy all of the Bureau of Ocean Energy Management's (BOEM) Renewable Energy Lease Area OCS-A 0534 and potentially a portion of Lease Area OCS-A 0501, hereafter referenced as the Southern Wind Development Area (SWDA). The SWDA is approximately 20 miles from the southwest corner of Martha's Vineyard and approximately 24 miles from Nantucket at its closest point.

Impacts could occur between the start of proposed Project construction in 2023 and the completion of proposed Project decommissioning, which would occur within 2 years of the end of the lease (up to 30 years post-construction). The geographic analysis area is defined by the impact-producing factor (IPF) with the maximum geographic area of impact (e.g., 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 Project. The geographic analysis area for these mobile resources is the general range of the species. The purpose of these geographic analysis areas is to capture the impacts from planned activities on each resource potentially impacted by the proposed project. The geographic analysis area for each resource area is defined in the resource area sections of the Draft Environmental Impact Statement (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.

## E.2 Reasonably Foreseeable Future Activities and Projects

This section includes a list and description of other reasonably foreseeable activities that could combine to contribute to impacts (also referred to as cumulative impacts) within the defined geographic analysis

[1] On July 16, 2020, the Council on Environmental Quality, which is responsible for federal agency implementation of the National Environmental Policy Act (NEPA), updated the regulations for implementing the procedural provisions of NEPA (Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, of the *Federal Register*, Volume 85, Issue 137, [July 16, 2020] pp. 43304–43376 [85 Fed. Reg. 137 pp. 43304–43376]). The Bureau of Ocean Energy Management (BOEM) prepared this Draft Environmental Impact Statement (EIS) consistent with the purpose and goals of NEPA (U.S. Code, Title 42, Section 4321 et seq. [42 USC § 4321 et seq.]) and pursuant to the Council on Environmental Quality's implementing NEPA regulations at 40 CFR Parts 1500–1508. Additionally, this EIS was prepared consistent with the Department of the Interior NEPA regulations (43 CFR Part 46), longstanding federal judicial and regulatory interpretations, and policies including Secretarial Order No. 3399 requiring bureaus and offices to use "the same application or level of NEPA that would have been applied to a proposed action before the 2020 Rule went into effect."

area for each resource category. Projects or actions that are considered speculative per the definition provided in 43 CFR § 46.30[2] are noted in subsequent tables but excluded from the planned activities impact analysis in EIS Chapter 3, Affected Environment and Environmental Consequences.

This EIS discusses resource-specific impacts that could occur if impacts associated with the Proposed Action would contribute to or overlap spatially or temporally with impacts from other past, present, or planned activities taking place within the region of the proposed Project, regardless of which agency or person undertakes the actions.

Planned 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.

## E.3 Offshore Wind Energy Development Activities

BOEM analyzed the possible extent of future offshore wind energy development activities on the Atlantic Outer Continental Shelf (OCS) to determine reasonably foreseeable impacts measured by installed power capacity. As a result of this process, BOEM has assumed that approximately 30 gigawatts (GW) of Atlantic offshore wind development are reasonably foreseeable along the East Coast. Reasonably foreseeable development includes 28 active wind energy lease areas (27 commercial and 1 research) (Figure E-1) on the Atlantic OCS, which include named projects and assumed future development within the remainder of lease areas outside of named project boundaries, as described in this appendix. Table E-1 represents the status of projects as of June 30, 2022. Levels of assumed future development are based on published Construction and Operations Plans (COP) and/or EISs for these projects, as well as state commitments to renewable energy development, publicly available information about turbine technology, and the size of potential development areas. These assumptions form the basis for analyzing potential resource-specific impacts (EIS Chapter 3).

Table E-1 includes some offshore wind projects that have already been approved and are either operating or under construction, including the Vineyard Wind 1 project (Lease Area OCS-A 0501) and South Fork Wind Project (Lease Area OCS-A 0517). Because these projects are approved, they are considered “ongoing” projects in the discussion of cumulative impacts in the resource-specific sections of Chapter 3. They are included in Table E-1 because their construction, operation, and decommissioning would overlap with the proposed Project, and would thus be part of the overall analysis of the proposed Project’s cumulative impacts.

[2] 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 consider 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.

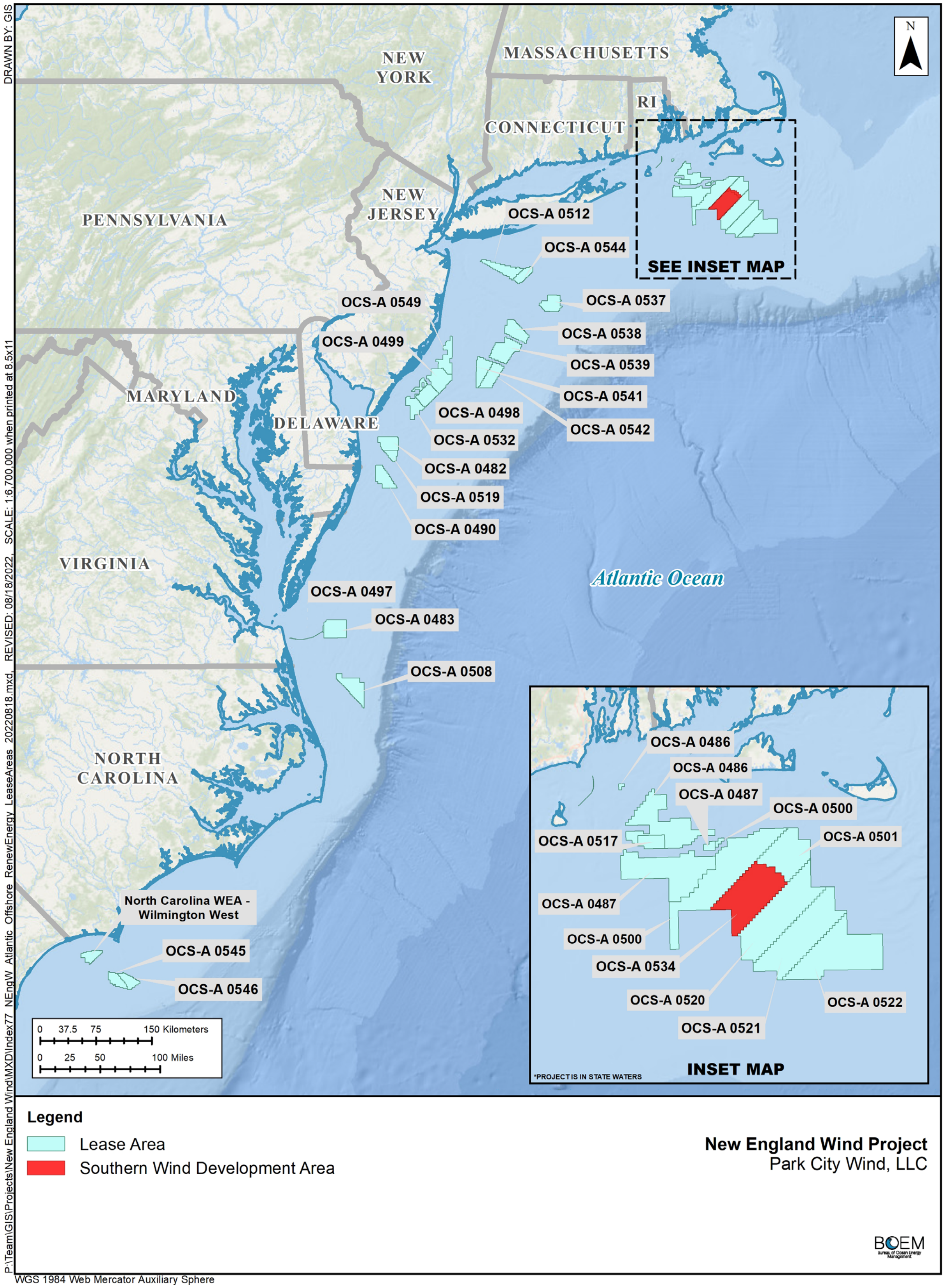


**Figure E-1: Wind Lease Areas Considered in Planned Activities Offshore Wind Scenario**

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**Table E-1: Offshore Wind Leasing Activities on the Atlantic Outer Continental Shelf: Projects and Assumptions (as of June 30, 2022)**

| | | | Maximum Number of WTGs | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Region** | **Lease** | **Name** | **Overall** | **Air Quality** | **Wetlands and Waters of the US** | **Benthic** | **Cultural Resources, Navigation and Vessel Traffic, Recreation and Tourism, Other Resources** | **Finfish, Invertebrates, and EFH** | **Commercial Fisheries and For-hire Recreational Fishing** | **Water Quality** | **Birds, Bats, Marine Mammals, Sea Turtles** | **Daytime Scenery and Visual, Cultural Resources (visual)** | **Nighttime Scenery and Visual, Cultural Resources (visual)** | **Demographics, Employment, and Economics; Environmental Justice; Land Use and Coastal Infrastructure; Coastal Habitats and Fauna; Terrestrial Habitats and Fauna; Other Uses (Aviation, Radars)** |
| NE | NA | NE Aqua Ventus I (state waters) | 2 | - | - | - | - | 2 | 2 | - | 2 | - | | - |
| NE | NA | Block Island (state waters) | 5 | - | - | - | - | 5 | 5 | - | 5 | - | | - |
| | | **Total State Waters** | **7** | **-** | **-** | **-** | **-** | **7** | **7** | **-** | **7** | **-** | | **-** |
| | | | | | | | | | | | | | | |
| MA/RI | 501 | Vineyard Wind 1 | 62 | 62 | 62 | 62 | 62 | 62 | 62 | 62 | 62 | 62 | 62 | 62 |
| MA/RI | 517 | South Fork Wind | 15 | - | 15 | - | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| MA/RI | 486 | Sunrise Wind | 122 | 81 | 122 | - | 122 | 122 | 122 | 122 | 122 | 122 | 122 | 122 |
| MA/RI | 487 | Revolution Wind | 100 | 12 | 100 | 40 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| MA/RI | 534 | New England Wind Phase 1 | 62 | 62 | 62 | 62 | 62 | 62 | 62 | 62 | 62 | 41 | 62 | 62 |
| MA/RI | 534 | New England Wind Phase 2 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 89 | 68 | 68 |
| MA/RI | 521 | Mayflower Wind | 147 | 147 | 147 | 49 | 147 | 147 | 147 | 147 | 147 | 135 | 76 | 147 |
| MA/RI | 520 | Beacon Wind | 103 | 103 | 103 | 103 | 103 | 103 | 103 | 103 | 103 | 103 | 110 | 103 |
| MA/RI | 500 | Bay State Wind | 165 | 165 | 165 | 165 | 165 | 165 | 165 | 165 | 165 | 165 | 160 | 165 |
| MA/RI | 522 | Liberty Wind (OCS-A 0522 LLC) | 138 | - | 138 | - | 138 | 138 | 138 | - | 138 | 131 | 47 | 138 |
| MA/RI | 520 | Remainder Beacon (0520) | 51 | - | 51 | 51 | 51 | 51 | 51 | - | 51 | 50 | - | 51 |
| | | **Total MA/RI Leases** | **1,033** | **700** | **1,033** | **600** | **1,033** | **1,033** | **1,033** | **844** | **1,033** | **1,013** | **822** | **1,033** |
| | | ***MA/RI Leases without NE Wind*** | ***903*** | ***570*** | ***903*** | ***470*** | ***903*** | ***903*** | ***903*** | ***714*** | ***903*** | ***883*** | ***692*** | ***903*** |
| | | | | | | | | | | | | | | |
| NY/NJ | 498 | Ocean Wind | 98 | - | - | - | - | 98 | 98 | - | 98 | - | | - |
| NY/NJ | 512 | Empire Wind 1 | 71 | - | - | - | - | 71 | 71 | - | 71 | - | | - |
| NY/NJ | 512 | Empire Wind 2 | 103 | - | - | - | - | 103 | 103 | - | 103 | - | | - |
| NY/NJ | 499 | Atlantic Shores 1 | 105 | - | - | - | - | 105 | 105 | - | 105 | - | | - |
| | 499 | Atlantic Shores 2 | 95 | | | | | 95 | 95 | | 95 | | | |
| NY/NJ | 532 | Ocean Wind 2 | 111 | - | - | - | - | 111 | 111 | - | 111 | - | | - |
| NY/NJ | 549 | Atlantic Shores North | 159 | - | - | - | - | 159 | 159 | - | 159 | - | | - |
| NY/NJ | 537 | OW Ocean Winds East OCS | 72 | - | - | - | - | 72 | 72 | - | 72 | - | | - |
| NY/NJ | 538 | Attentive Energy | 80 | - | - | - | - | 80 | 80 | - | 80 | - | | - |
| NY/NJ | 539 | Bight Wind Holdings | 116 | - | - | - | - | 116 | 116 | - | 116 | - | | - |
| NY/NJ | 541 | Atlantic Shores Offshore Wind Bight | 77 | - | - | - | - | 77 | 77 | - | 77 | - | | - |
| NY/NJ | 542 | Invenergy Wind Offshore | 78 | - | - | - | - | 78 | 78 | - | 78 | - | | - |
| NY/NJ | 544 | Mid-Atlantic Offshore Wind | 44 | - | - | - | - | 44 | 44 | - | 44 | - | | - |
| | | **Total NY/NJ Leases** | **1,209** | **-** | **-** | **-** | **-** | **1,209** | **1,209** | **-** | **1,209** | **-** | | **-** |
| | | | | | | | | | | | | | | |
| DE/MD | 519 | Skipjack | 16 | - | - | - | - | 16 | 16 | - | 16 | - | | - |
| DE/MD | 490 | US Wind | 121 | - | - | - | - | 121 | 121 | - | 121 | - | | - |
| DE/MD | 482 | GSOE I | 90 | - | - | - | - | 90 | 90 | - | 90 | - | | - |
| | | **Total DE/MD Leases** | **227** | **-** | **-** | **-** | **-** | **227** | **227** | **-** | **227** | **-** | | **-** |
| | | | | | | | | | | | | | | - |
| VA/NC | 497 | CVOW Demonstration | 2 | - | - | - | - | 2 | 2 | - | 2 | - | | - |
| VA/NC | 483 | CVOW | 205 | - | - | - | - | 205 | 205 | - | 205 | - | | - |
| VA/NC | 508 | Kitty Hawk Wind | 69 | - | - | - | - | 69 | 69 | - | 69 | - | | - |
| VA/NC | 545 | Total Energies | 79 | - | - | - | - | 79 | | - | 79 | - | | - |
| VA/NC | 546 | Duke Energy | 79 | - | - | - | - | 79 | | - | 79 | - | | - |
| VA/NC | 508 | Kitty Hawk South | 121 | - | - | - | - | 121 | 121 | - | 121 | - | | - |
| | | **Total VA/NC Leases** | **555** | **-** | **-** | **-** | **-** | **555** | **397** | **-** | **555** | **-** | | **-** |
| | | | | | | | | | | | | | | |
| | | **Atlantic OCS Total** | **3,031** | **700** | **1,033** | **600** | **1,033** | **3,031** | **2,873** | **844** | **3,031** | **1,013** | **822** | **1,033** |
| | | ***Atlantic OCS Total Without NE Wind*** | ***2,901*** | ***570*** | ***903*** | ***470*** | ***903*** | ***2,901*** | ***2,743*** | ***714*** | ***2,901*** | ***883*** | ***692*** | ***903*** |

CO = carbon monoxide; $CO_2e$ = carbon dioxide equivalent; DE = Delaware; HAP = hazardous air pollutants; MA = Massachusetts; MD = Maryland; NA = Not Applicable; NC = North Carolina; NE = New England; NJ = New Jersey; NOx = nitrogen oxide; NY = New York; $PM_{10}$ = particulate matter smaller than 10 microns; $PM_{2.5}$ = particulate matter smaller than 2.5 microns; RI = Rhode Island; $SO_2$ = sulfur dioxide; VA = Virginia; VOC = volatile organic compounds

| Region | Lease | Name | Maximum Number of Foundations | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **Overall** | **Air Quality** | **Wetlands and Waters of the US** | **Benthic** | **Cultural Resources, Navigation and Vessel Traffic, Other Resources** | **Finfish, Invertebrates, and EFH** | **Commercial Fisheries and For-hire Recreational Fishing** | **Water Quality** | **Birds, Bats, Marine Mammals, Sea Turtles** | **Scenery and Visual, Cultural Resources (visual), Other Uses (Aviation, Radars)** | **Demographics, Employment, and Economics; Environmental Justice; Land Use and Coastal Infrastructure; Coastal Habitats and Fauna; Terrestrial Habitats and Fauna** |
| NE | NA | NE Aqua Ventus I (state waters) | 2 | - | - | - | - | 2 | 2 | - | 2 | - | - |
| NE | NA | Block Island (state waters) | 5 | - | - | - | - | 5 | 5 | - | 5 | - | - |
| | | **Total State Waters** | **7** | **-** | **-** | **-** | **-** | **7** | **7** | **-** | **7** | **-** | **-** |
| | | | | | | | | | | | | | |
| MA/RI | 501 | Vineyard Wind 1 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 |
| MA/RI | 517 | South Fork Wind | 16 | - | 16 | - | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| MA/RI | 486 | Sunrise Wind | 123 | 81 | 123 | - | 123 | 123 | 123 | 123 | 123 | 123 | 123 |
| MA/RI | 487 | Revolution Wind | 102 | 12 | 102 | 40 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |
| MA/RI | 534 | New England Wind Phase 1 | 62 | 62 | 62 | 62 | 62 | 62 | 62 | 62 | 62 | 41 | 62 |
| MA/RI | 534 | New England Wind Phase 2 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 89 | 68 |
| MA/RI | 521 | Mayflower Wind | 149 | 149 | 149 | 49 | 149 | 149 | 149 | 149 | 149 | 149 | 149 |
| MA/RI | 520 | Beacon Wind | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 106 |
| MA/RI | 500 | Bay State Wind | 165 | 165 | 165 | 165 | 165 | 165 | 165 | 165 | 165 | 165 | 165 |
| MA/RI | 522 | Liberty Wind (OCS-A 0522 LLC) | 138 | - | 138 | - | 138 | 138 | 138 | - | 138 | 138 | 138 |
| MA/RI | 520 | Remainder Beacon (0520) | 51 | - | 51 | 51 | 51 | 51 | 51 | - | 51 | 51 | 51 |
| | | **Total MA/RI Leases** | **1,043** | **706** | **1,043** | **604** | **1,043** | **1,043** | **1,043** | **854** | **1,043** | **1,043** | **1,043** |
| | | ***MA/RI Leases without NE Wind*** | ***913*** | ***576*** | ***913*** | ***474*** | ***913*** | ***913*** | ***913*** | ***724*** | ***913*** | ***913*** | ***913*** |
| | | | | | | | | | | | | | |
| NY/NJ | 498 | Ocean Wind | 101 | - | - | - | - | 101 | 101 | - | 101 | - | - |
| NY/NJ | 512 | Empire Wind 1 | 72 | - | - | - | - | 72 | 72 | - | 72 | - | - |
| NY/NJ | 512 | Empire Wind 2 | 104 | - | - | - | - | 104 | 104 | - | 104 | - | - |
| NY/NJ | 499 | Atlantic Shores 1 | 110 | - | - | - | - | 110 | 110 | - | 110 | - | - |
| | 499 | Atlantic Shores 2 | 100 | | | | | 100 | 100 | | 100 | | |
| NY/NJ | 532 | Ocean Wind 2 | 113 | - | - | - | - | 113 | 113 | - | 113 | - | - |
| NY/NJ | 549 | Atlantic Shores North | 159 | - | - | - | - | 159 | 159 | - | 159 | - | - |
| NY/NJ | 537 | OW Ocean Winds East OCS | 74 | - | - | - | - | 74 | 74 | - | 74 | - | - |
| NY/NJ | 538 | Attentive Energy | 82 | - | - | - | - | 82 | 82 | - | 82 | - | - |
| NY/NJ | 539 | Bight Wind Holdings | 118 | - | - | - | - | 118 | 118 | - | 118 | - | - |
| NY/NJ | 541 | Atlantic Shores Offshore Wind Bight | 79 | - | - | - | - | 79 | 79 | - | 79 | - | - |
| NY/NJ | 542 | Invenergy Wind Offshore | 80 | - | - | - | - | 80 | 80 | - | 80 | - | - |
| NY/NJ | 544 | Mid-Atlantic Offshore Wind | 45 | - | - | - | - | 45 | 45 | - | 45 | - | - |
| | | **Total NY/NJ Leases** | **1,237** | **-** | **-** | **-** | **-** | **1,237** | **1,237** | **-** | **1,237** | **-** | **-** |
| | | | | | | | | | | | | | |
| DE/MD | 519 | Skipjack | 17 | - | - | - | - | 17 | 17 | - | 17 | - | - |
| DE/MD | 490 | US Wind | 125 | - | - | - | - | 125 | 125 | - | 125 | - | - |
| DE/MD | 482 | GSOE I | 93 | - | - | - | - | 93 | 93 | - | 93 | - | - |
| | | **Total DE/MD Leases** | **235** | **-** | **-** | **-** | **-** | **235** | **235** | **-** | **235** | **-** | **-** |
| | | | | | | | | | | | | | - |
| VA/NC | 497 | CVOW Demonstration | 2 | - | - | - | - | 2 | 2 | - | 2 | - | - |
| VA/NC | 483 | CVOW | 208 | - | - | - | - | 208 | 208 | - | 208 | - | - |
| VA/NC | 508 | Kitty Hawk Wind | 70 | - | - | - | - | 70 | 70 | - | 70 | - | - |
| VA/NC | 545 | Total Energies | 80 | - | - | - | - | 80 | | - | 80 | - | - |
| VA/NC | 546 | Duke Energy | 80 | - | - | - | - | 80 | | - | 80 | - | - |
| VA/NC | 508 | Kitty Hawk South | 123 | - | - | - | - | 123 | 123 | - | 123 | - | - |
| | | **Total VA/NC Leases** | **563** | **-** | **-** | **-** | **-** | **563** | **403** | **-** | **563** | **-** | **-** |
| | | | | | | | | | | | | | |
| | | **Atlantic OCS Total** | **3,085** | **706** | **1,043** | **604** | **1,043** | **3,085** | **2,925** | **854** | **3,085** | **3,085** | **3,085** |
| | | ***Atlantic OCS Total Without NE Wind*** | ***2,955*** | ***576*** | ***913*** | ***474*** | ***913*** | ***2,955*** | ***2,795*** | ***724*** | ***2,955*** | ***2,955*** | ***2,955*** |

| Region | Lease | Name | OECC Length (mi) | Inter-Array + Inter-Link Cable Length (mi) | Total Footprint of Foundations (Acres) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Overall** | **Wetlands and Waters of the US** | **Benthic** | **Cultural Resources** | **Navigation and Vessel Traffic, Recreation and Tourism, Other Resources** | **Finfish, Invertebrates, and EFH** | **Commercial Fisheries and For-hire Recreational Fishing** | **Water Quality** | **Birds, Bats, Marine Mammals, Sea Turtles** | **Demographics, Employment, and Economics; Environmental Justice;** |
| NE | NA | NE Aqua Ventus I (state waters) | | | NA | | | | | | - | | | |
| NE | NA | Block Island (state waters) | | | 1.0 | | | | | | - | | | |
| | | **Total State Waters** | | | | | | | | | - | | | |
| | | | | | | | | | | | | | | |
| MA/RI | 501 | Vineyard Wind 1 | 49 | 177 | 1.3 | 1.3 | 1.3 | - | 1.3 | 1.3 | 1 | 1.3 | 1.3 | 1.3 |
| MA/RI | 517 | South Fork Wind | 139 | 21 | 14.8 | 14.8 | - | - | 14.8 | 14.8 | 15 | 14.8 | 14.8 | 14.8 |
| MA/RI | 486 | Sunrise Wind | 106 | 186 | 6.4 | 6.4 | - | - | 6.4 | 6.4 | 6 | 6.4 | 6.4 | 6.4 |
| MA/RI | 487 | Revolution Wind | 50 | 164 | 5.1 | 5.1 | 2.0 | - | 5.1 | 5.1 | 5 | 5.1 | 5.1 | 5.1 |
| MA/RI | 534 | New England Wind Phase 1 | 126 | 152 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 2 | 1.7 | 1.7 | 1.7 |
| MA/RI | 534 | New England Wind Phase 2 | 221 | 239 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 3 | 2.7 | 2.7 | 2.7 |
| MA/RI | 521 | Mayflower Wind | 744 | 497 | 7.5 | 7.5 | 2.5 | - | 7.5 | 7.5 | 7 | 7.5 | 7.5 | 7.5 |
| MA/RI | 520 | Beacon Wind | 120 | 257 | 5.3 | 5.3 | 5.3 | - | 5.3 | 5.3 | 5 | 5.3 | 5.3 | 5.3 |
| MA/RI | 500 | Bay State Wind | 120 | 412 | 8.3 | 8.3 | 8.3 | - | 8.3 | 8.3 | 8 | 8.3 | 8.3 | 8.3 |
| MA/RI | 522 | Liberty Wind (OCS-A 0522 LLC) | 120 | 344 | 6.9 | 6.9 | - | - | 6.9 | 6.9 | 7 | - | 6.9 | 6.9 |
| MA/RI | 520 | Remainder Beacon (0520) | - | 127 | 2.6 | 2.6 | 2.6 | - | 2.6 | 2.6 | 3 | - | 2.6 | 2.6 |
| | | **Total MA/RI Leases** | **1,794.3** | **2,576.9** | **62.4** | **62.4** | **26.3** | **4.4** | **62.4** | **62.4** | **62** | **53.0** | **62.4** | **62.4** |
| | | ***MA/RI Leases without NE Wind*** | ***1,448*** | ***2,186*** | ***58.0*** | ***58.0*** | ***21.9*** | ***-*** | ***58.0*** | ***58.0*** | ***58*** | ***48.6*** | ***58.0*** | ***58.0*** |
| | | | | | | | | | | | | | | |
| NY/NJ | 498 | Ocean Wind | 71 | 190 | 3.0 | | | | | 3.0 | 3 | | 3.0 | |
| NY/NJ | 512 | Empire Wind 1 | 46 | 133 | 42.4 | | | | | 42.4 | 42 | | 42.4 | |
| NY/NJ | 512 | Empire Wind 2 | 30 | 166 | 61.1 | | | | | 61.1 | 61 | | 61.1 | |
| NY/NJ | 499 | Atlantic Shores 1 | 99 | 292 | 19.1 | | | | | 19.1 | 19 | | 19.1 | |
| | 499 | Atlantic Shores 2 | 342 | 292 | 17.4 | | | | | 17.4 | 17 | | 17.4 | |
| NY/NJ | 532 | Ocean Wind 2 | | | 5.7 | | | | | 5.7 | 6 | | 5.7 | |
| NY/NJ | 549 | Atlantic Shores North | | | 27.7 | | | | | 27.7 | 28 | | 27.7 | |
| NY/NJ | 537 | OW Ocean Winds East OCS | | | 3.7 | | | | | 3.7 | 4 | | 3.7 | |
| NY/NJ | 538 | Attentive Energy | | | 4.1 | | | | | 4.1 | 4 | | 4.1 | |
| NY/NJ | 539 | Bight Wind Holdings | | | 5.9 | | | | | 5.9 | 6 | | 5.9 | |
| NY/NJ | 541 | Atlantic Shores Offshore Wind Bight | | | 4.0 | | | | | 4.0 | 4 | | 4.0 | |
| NY/NJ | 542 | Invenergy Wind Offshore | | | 4.0 | | | | | 4.0 | 4 | | 4.0 | |
| NY/NJ | 544 | Mid-Atlantic Offshore Wind | | | 2.3 | | | | | 2.3 | 2 | | 2.3 | |
| | | **Total NY/NJ Leases** | | | **200.3** | **-** | **-** | | **-** | **200.3** | **200** | **-** | **200.3** | **-** |
| | | | | | | | | | | | | | | |
| DE/MD | 519 | Skipjack | | | 0.9 | | | | | 0.9 | 1 | | 0.9 | |
| DE/MD | 490 | US Wind | 146 | 152 | 3.7 | | | | | 3.7 | 4 | | 3.7 | |
| DE/MD | 482 | GSOE I | | | 4.7 | | | | | 4.7 | 5 | | 4.7 | |
| | | **Total DE/MD Leases** | | | **9.2** | **-** | **-** | | **-** | **9.2** | **9** | **-** | **9.2** | **-** |
| | | | | | | | | | | | | | | |
| VA/NC | 497 | CVOW Demonstration | | | 0.1 | | | | | 0.1 | 0 | | 0.1 | |
| VA/NC | 483 | CVOW | 49 | 301 | 40.5 | | | | | 40.5 | 41 | | 40.5 | |
| VA/NC | 508 | Kitty Hawk Wind | 112 | 149 | 20.8 | | | | | 20.8 | 21 | | 20.8 | |
| VA/NC | 545 | Total Energies | | | 4.0 | | | | | 4.0 | | | 4.0 | |
| VA/NC | 546 | Duke Energy | | | 4.0 | | | | | 4.0 | | | 4.0 | |
| VA/NC | 508 | Kitty Hawk South | 200 | 149 | 6.2 | | | | | 6.2 | 6 | | 6.2 | |
| | | **Total VA/NC Leases** | | | **75.6** | **-** | **-** | | **-** | **75.6** | **68** | **-** | **75.6** | **-** |
| | | | | | | | | | | | | | | |
| | | **Atlantic OCS Total** | | | **347.4** | **62.4** | **26.3** | **4** | **62.4** | **347.4** | **339** | **53.0** | **347.4** | **62.4** |
| | | ***Atlantic OCS Total Without NE Wind*** | | | ***343*** | ***58*** | ***22*** | ***-*** | ***58*** | ***343*** | ***335*** | ***49*** | ***343*** | ***58*** |

| | | | Seabed Disturbance (Foundation + Scour Protection) (Acres) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Region** | **Lease** | **Name** | **Overall** | **Wetlands and Waters of the US** | **Benthic** | **Cultural Resources** | **Navigation and Vessel Traffic, Recreation and Tourism, Other Resources** | **Finfish, Invertebrates, and EFH** | **Commercial Fisheries and For-hire Recreational Fishing** | **Water Quality** | **Birds, Bats, Marine Mammals, Sea Turtles** | **Demographics, Employment, and Economics; Environmental Justice;** |
| NE | NA | NE Aqua Ventus I (state waters) | NA | | | | | | - | | | |
| NE | NA | Block Island (state waters) | 6 | | | | | | - | | | |
| | | **Total State Waters** | | | | | | | - | | | |
| | | | | | | | | | | | | |
| MA/RI | 501 | Vineyard Wind 1 | 32.7 | 32.7 | 32.7 | - | 32.7 | 32.7 | 33 | 32.7 | 32.7 | 32.7 |
| MA/RI | 517 | South Fork Wind | 22.3 | 22.3 | - | - | 22.3 | 22.3 | 22 | 22.3 | 22.3 | 22.3 |
| MA/RI | 486 | Sunrise Wind | 4,624.6 | 4,624.6 | | - | 4,624.6 | 4,624.6 | 4,625 | 4,624.6 | 4,624.6 | 4,624.6 |
| MA/RI | 487 | Revolution Wind | 174.0 | 174.0 | 69.6 | - | 174.0 | 174.0 | 174 | 174.0 | 174.0 | 174.0 |
| MA/RI | 534 | New England Wind Phase 1 | 74.0 | 74.0 | 74.0 | 74.0 | 74.0 | 74.0 | 74 | 74.0 | 74.0 | 74.0 |
| MA/RI | 534 | New England Wind Phase 2 | 204.0 | 204.0 | 204.0 | 204.0 | 204.0 | 204.0 | 204 | 204.0 | 204.0 | 204.0 |
| MA/RI | 521 | Mayflower Wind | 1,697.0 | 1,697.0 | 565.7 | - | 1,697.0 | 1,697.0 | 1,697 | 1,697.0 | 1,697.0 | 1,697.0 |
| MA/RI | 520 | Beacon Wind | 265.0 | 265.0 | 265.0 | - | 265.0 | 265.0 | 265 | 265.0 | 265.0 | 265.0 |
| MA/RI | 500 | Bay State Wind | 165.0 | 165.0 | 165.0 | - | 165.0 | 165.0 | 165 | 165.0 | 165.0 | 165.0 |
| MA/RI | 522 | Liberty Wind (OCS-A 0522 LLC) | 138.0 | 138.0 | - | - | 138.0 | 138.0 | 138 | - | 138.0 | 138.0 |
| MA/RI | 520 | Remainder Beacon (0520) | 51.0 | 51.0 | 51.0 | - | 51.0 | 51.0 | 51 | - | 51.0 | 51.0 |
| | | **Total MA/RI Leases** | **7,447.6** | **7,447.6** | **1,427.0** | **278.0** | **7,447.6** | **7,447.6** | **7,448** | **7,258.6** | **7,447.6** | **7,447.6** |
| | | ***MA/RI Leases without NE Wind*** | ***7,169.6*** | ***7,169.6*** | ***1,149.0*** | ***-*** | ***7,169.6*** | ***7,169.6*** | ***7,170*** | ***6,980.6*** | ***7,169.6*** | ***7,169.6*** |
| | | | | | | | | | | | | |
| NY/NJ | 498 | Ocean Wind | 101.9 | | | | | 101.9 | 102 | | 101.9 | |
| NY/NJ | 512 | Empire Wind 1 | 647.4 | | | | | 647.4 | 647 | | 647.4 | |
| NY/NJ | 512 | Empire Wind 2 | 938.2 | | | | | 938.2 | 938 | | 938.2 | |
| NY/NJ | 499 | Atlantic Shores 1 | 402.4 | | | | | 402.4 | 402 | | 402.4 | |
| | 499 | Atlantic Shores 2 | 365.8 | | | | | 365.8 | 366 | | 365.8 | |
| NY/NJ | 532 | Ocean Wind 2 | 531.3 | | | | | 531.3 | 531 | | 531.3 | |
| NY/NJ | 549 | Atlantic Shores North | 581.62 | | | | | 581.6 | 582 | | 581.6 | |
| NY/NJ | 537 | OW Ocean Winds East OCS | 347.9 | | | | | 347.9 | 348 | | 347.9 | |
| NY/NJ | 538 | Attentive Energy | 385.5 | | | | | 385.5 | 386 | | 385.5 | |
| NY/NJ | 539 | Bight Wind Holdings | 554.8 | | | | | 554.8 | 555 | | 554.8 | |
| NY/NJ | 541 | Atlantic Shores Offshore Wind Bight | 371.4 | | | | | 371.4 | 371 | | 371.4 | |
| NY/NJ | 542 | Invenergy Wind Offshore | 376.1 | | | | | 376.1 | 376 | | 376.1 | |
| NY/NJ | 544 | Mid-Atlantic Offshore Wind | 211.6 | | | | | 211.6 | 212 | | 211.6 | |
| | | **Total NY/NJ Leases** | **5,816** | **-** | **-** | | **-** | **5,816** | **5,816** | **-** | **5,816** | **-** |
| | | | | | | | | | | | | |
| DE/MD | 519 | Skipjack | 14.5 | | | | | 14.5 | 14 | | 14.5 | |
| DE/MD | 490 | US Wind | 32.1 | | | | | 32.1 | 32 | | 32.1 | |
| DE/MD | 482 | GSOE I | 79.1 | | | | | 79.1 | 79 | | 79.1 | |
| | | **Total DE/MD Leases** | **125.6** | **-** | **-** | | **-** | **125.6** | **126** | **-** | **125.6** | **-** |
| | | | | | | | | | | | | |
| VA/NC | 497 | CVOW Demonstration | 1.7 | | | | | 1.7 | 2 | | 1.7 | |
| VA/NC | 483 | CVOW | 121.6 | | | | | 121.6 | 122 | | 121.6 | |
| VA/NC | 508 | Kitty Hawk Wind | 55.6 | | | | | 55.6 | 56 | | 55.6 | |
| VA/NC | 545 | Total Energies | 67.9 | | | | | 67.9 | | | 67.9 | |
| VA/NC | 546 | Duke Energy | 68.2 | | | | | 68.2 | | | 68.2 | |
| VA/NC | 508 | Kitty Hawk South | 104.6 | | | | | 104.6 | 105 | | 104.6 | |
| | | **Total VA/NC Leases** | **419.6** | **-** | **-** | | **-** | **419.6** | **283** | **-** | **419.6** | **-** |
| | | | | | | | | | | | | |
| | | **Atlantic OCS Total** | **13,809** | **7,448** | **1,427** | | **7,448** | **13,809** | **13,673** | **7,259** | **13,809** | **7,448** |
| | | ***Atlantic OCS Total Without NE Wind*** | ***13,531*** | ***7,170*** | ***1,149*** | | ***7,170*** | ***13,531*** | ***13,395*** | ***6,981*** | ***13,531*** | ***7,170*** |

| | | | OEC Seabed Disturbance (Acres) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Region** | **Lease** | **Name** | **Overall** | **Wetlands and Waters of the US** | **Benthic** | **Cultural Resources** | **Navigation and Vessel Traffic, Recreation and Tourism, Other Resources** | **Finfish, Invertebrates, and EFH** | **Commercial Fisheries and For-hire Recreational Fishing** | **Water Quality** | **Birds, Bats, Marine Mammals, Sea Turtles** | **Demographics, Employment, and Economics; Environmental Justice;** |
| NE | NA | NE Aqua Ventus I (state waters) | NA | | | | | | - | | | |
| NE | NA | Block Island (state waters) | NA | | | | | | - | | | |
| | | **Total State Waters** | | | | | | | - | | | |
| | | | | | | | | | | | | |
| MA/RI | 501 | Vineyard Wind 1 | 69 | 69.0 | 69.0 | 69.0 | 69.0 | 69.0 | 69 | 69.0 | 69.0 | 69.0 |
| MA/RI | 517 | South Fork Wind | 573 | 573.3 | - | - | 573.3 | 573.3 | 573 | 573.3 | 573.3 | 573.3 |
| MA/RI | 486 | Sunrise Wind | 1,259 | 1,259.0 | - | - | 1,259.0 | 1,259.0 | 1,259 | 1,259.0 | 1,259.0 | 1,259.0 |
| MA/RI | 487 | Revolution Wind | 1,325 | 1,324.5 | 529.8 | - | 1,324.5 | 1,324.5 | 1,325 | 1,324.5 | 1,324.5 | 1,324.5 |
| MA/RI | 534 | New England Wind Phase 1 | 252 | 252.0 | 252.0 | 252.0 | 252.0 | 252.0 | 252 | 252.0 | 252.0 | 252.0 |
| MA/RI | 534 | New England Wind Phase 2 | 358 | 358.0 | 358.0 | 358.0 | 358.0 | 358.0 | 358 | 358.0 | 358.0 | 358.0 |
| MA/RI | 521 | Mayflower Wind | 2,480 | 2,480.0 | 826.7 | - | 2,480.0 | 2,480.0 | 2,480 | 2,480.0 | 2,480.0 | 2,480.0 |
| MA/RI | 520 | Beacon Wind | 902 | 902.3 | 902.3 | - | 902.3 | 902.3 | 902 | 902.3 | 902.3 | 902.3 |
| MA/RI | 500 | Bay State Wind | 902 | 902.3 | 902.3 | - | 902.3 | 902.3 | 902 | 902.3 | 902.3 | 902.3 |
| MA/RI | 522 | Liberty Wind (OCS-A 0522 LLC) | 902 | 902.3 | - | - | 902.3 | 902.3 | 902 | - | 902.3 | 902.3 |
| MA/RI | 520 | Remainder Beacon (0520) | 902 | 902.3 | 902.3 | - | 902.3 | 902.3 | 902 | - | 902.3 | 902.3 |
| | | **Total MA/RI Leases** | **9,925** | **9,924.8** | **4,742.2** | **679.0** | **9,924.8** | **9,924.8** | **9,925** | **8,120.3** | **9,924.8** | **9,924.8** |
| | | ***MA/RI Leases without NE Wind*** | ***9,314.8*** | ***9,314.8*** | ***4,132.2*** | ***69.0*** | ***9,314.8*** | ***9,314.8*** | ***9,315*** | ***7,510.3*** | ***9,314.8*** | ***9,314.8*** |
| | | | | | | | | | | | | |
| NY/NJ | 498 | Ocean Wind | 1,750.0 | | | | | 1,750.0 | 1,750 | | 1,750.0 | |
| NY/NJ | 512 | Empire Wind 1 | 704.0 | | | | | 704.0 | 704 | | 704.0 | |
| NY/NJ | 512 | Empire Wind 2 | 1,606.0 | | | | | 1,606.0 | 1,606 | | 1,606.0 | |
| NY/NJ | 499 | Atlantic Shores 1 | 768.0 | | | | | 768.0 | 768 | | 768.0 | |
| | 499 | Atlantic Shores 2 | 1,836.8 | | | | | 1,836.8 | 1,837 | | 1,836.8 | |
| NY/NJ | 532 | Ocean Wind 2 | 1,750.0 | | | | | 1,750.0 | 1,750 | | 1,750.0 | |
| NY/NJ | 549 | Atlantic Shores North | 1,836.8 | | | | | 1,836.8 | 1,837 | | 1,836.8 | |
| NY/NJ | 537 | OW Ocean Winds East OCS | 3,212.0 | | | | | 3,212.0 | 3,212 | | 3,212.0 | |
| NY/NJ | 538 | Attentive Energy | 3,673.6 | | | | | 3,673.6 | 3,674 | | 3,673.6 | |
| NY/NJ | 539 | Bight Wind Holdings | 3,673.6 | | | | | 3,673.6 | 3,674 | | 3,673.6 | |
| NY/NJ | 541 | Atlantic Shores Offshore Wind Bight | 3,673.6 | | | | | 3,673.6 | 3,674 | | 3,673.6 | |
| NY/NJ | 542 | Invenergy Wind Offshore | 3,673.6 | | | | | 3,673.6 | 3,674 | | 3,673.6 | |
| NY/NJ | 544 | Mid-Atlantic Offshore Wind | 1,606.0 | | | | | 1,606.0 | 1,606 | | 1,606.0 | |
| | | **Total NY/NJ Leases** | **29,764** | **-** | **-** | | **-** | **29,764** | **29,764** | **-** | **29,764** | **-** |
| | | | | | | | | | | | | |
| DE/MD | 519 | Skipjack | 69.7 | | | | | 69.7 | 70 | | 69.7 | |
| DE/MD | 490 | US Wind | 69.7 | | | | | 69.7 | 70 | | 69.7 | |
| DE/MD | 482 | GSOE I | 69.7 | | | | | 69.7 | 70 | | 69.7 | |
| | | **Total DE/MD Leases** | **209** | **-** | **-** | | **-** | **209.0** | **209** | **-** | **209.0** | **-** |
| | | | | | | | | | | | | |
| VA/NC | 497 | CVOW Demonstration | 33.0 | | | | | 33.0 | 33 | | 33.0 | |
| VA/NC | 483 | CVOW | 458.0 | | | | | 458.0 | 458 | | 458.0 | |
| VA/NC | 508 | Kitty Hawk Wind | 726.6 | | | | | 726.6 | 727 | | 726.6 | |
| VA/NC | 545 | Total Energies | 726.6 | | | | | 726.6 | | | 726.6 | |
| VA/NC | 546 | Duke Energy | 726.6 | | | | | 726.6 | | | 726.6 | |
| VA/NC | 508 | Kitty Hawk South | 1,297.5 | | | | | 1,297.5 | 1,298 | | 1,297.5 | |
| | | **Total VA/NC Leases** | **3,968** | **-** | **-** | | **-** | **3,968.4** | **2,515** | **-** | **3,968.4** | **-** |
| | | | | | | | | | | | | |
| | | **Atlantic OCS Total** | **43,866** | **9,925** | **4,742** | **679** | **9,925** | **43,866** | **42,413** | **8,120** | **43,866** | **9,925** |
| | | ***Atlantic OCS Total Without NE Wind*** | ***43,256*** | ***9,315*** | ***4,132*** | ***69*** | ***9,315*** | ***43,256*** | ***41,803*** | ***7,510*** | ***43,256*** | ***9,315*** |

| | | | OEC Hard Protection (Acres) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Region** | **Lease** | **Name** | **Overall** | **Wetlands and Waters of the US** | **Benthic** | **Cultural Resources** | **Navigation and Vessel Traffic, Recreation and Tourism, Other Resources** | **Finfish, Invertebrates, and EFH** | **Commercial Fisheries and For-hire Recreational Fishing** | **Water Quality** | **Birds, Bats, Marine Mammals, Sea Turtles** | **Demographics, Employment, and Economics; Environmental Justice;** |
| NE | NA | NE Aqua Ventus I (state waters) | NA | | | | | | - | | | |
| NE | NA | Block Island (state waters) | NA | | | | | | - | | | |
| | | **Total State Waters** | | | | | | | - | | | |
| | | | | | | | | | | | | |
| MA/RI | 501 | Vineyard Wind 1 | 35 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35 | 35.0 | 35.0 | 35.0 |
| MA/RI | 517 | South Fork Wind | 8.2 | 8.2 | - | - | 8.2 | 8.2 | 8 | 8.2 | 8.2 | 8.2 |
| MA/RI | 486 | Sunrise Wind | 47.4 | 47.4 | - | - | 47.4 | 47.4 | 47 | 47.4 | 47.4 | 47.4 |
| MA/RI | 487 | Revolution Wind | 60.5 | 60.5 | 24.2 | - | 60.5 | 60.5 | 61 | 60.5 | 60.5 | 60.5 |
| MA/RI | 534 | New England Wind Phase 1 | 24 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24 | 24.0 | 24.0 | 24.0 |
| MA/RI | 534 | New England Wind Phase 2 | 37 | 37.0 | 37.0 | 37.0 | 37.0 | 37.0 | 37 | 37.0 | 37.0 | 37.0 |
| MA/RI | 521 | Mayflower Wind | 247 | 247.0 | 82.3 | - | 247.0 | 247.0 | 247 | 247.0 | 247.0 | 247.0 |
| MA/RI | 520 | Beacon Wind | 38.4 | 38.4 | 38.4 | - | 38.4 | 38.4 | 38 | 38.4 | 38.4 | 38.4 |
| MA/RI | 500 | Bay State Wind | 38.4 | 38.4 | 38.4 | - | 38.4 | 38.4 | 38 | 38.4 | 38.4 | 38.4 |
| MA/RI | 522 | Liberty Wind (OCS-A 0522 LLC) | 38.4 | 38.4 | - | - | 38.4 | 38.4 | 38 | - | 38.4 | 38.4 |
| MA/RI | 520 | Remainder Beacon (0520) | 38.4 | 38.4 | 38.4 | - | 38.4 | 38.4 | 38 | - | 38.4 | 38.4 |
| | | **Total MA/RI Leases** | **613** | **612.7** | **317.8** | **96.0** | **612.7** | **612.7** | **613** | **535.9** | **612.7** | **612.7** |
| | | ***MA/RI Leases without NE Wind*** | ***551.7*** | ***551.7*** | ***256.8*** | ***35.0*** | ***551.7*** | ***551.7*** | ***552*** | ***474.9*** | ***551.7*** | ***551.7*** |
| | | | | | | | | | | | | |
| NY/NJ | 498 | Ocean Wind | 86.0 | | | | | 86.0 | 86 | | 86.0 | |
| NY/NJ | 512 | Empire Wind 1 | 17.2 | | | | | 17.2 | 17 | | 17.2 | |
| NY/NJ | 512 | Empire Wind 2 | 10.0 | | | | | 10.0 | 10 | | 10.0 | |
| NY/NJ | 499 | Atlantic Shores 1 | 15.8 | | | | | 15.8 | 16 | | 15.8 | |
| | 499 | Atlantic Shores 2 | 59.3 | | | | | 59.3 | 59 | | 59.3 | |
| NY/NJ | 532 | Ocean Wind 2 | 86 | | | | | 86.0 | 86 | | 86.0 | |
| NY/NJ | 549 | Atlantic Shores North | 59.3 | | | | | 59.3 | 59 | | 59.3 | |
| NY/NJ | 537 | OW Ocean Winds East OCS | 19.9 | | | | | 19.9 | 20 | | 19.9 | |
| NY/NJ | 538 | Attentive Energy | 118.6 | | | | | 118.6 | 119 | | 118.6 | |
| NY/NJ | 539 | Bight Wind Holdings | 118.6 | | | | | 118.6 | 119 | | 118.6 | |
| NY/NJ | 541 | Atlantic Shores Offshore Wind Bight | 118.6 | | | | | 118.6 | 119 | | 118.6 | |
| NY/NJ | 542 | Invenergy Wind Offshore | 118.6 | | | | | 118.6 | 119 | | 118.6 | |
| NY/NJ | 544 | Mid-Atlantic Offshore Wind | 10.0 | | | | | 10.0 | 10 | | 10.0 | |
| | | **Total NY/NJ Leases** | **838** | **-** | **-** | | **-** | **838** | **838** | **-** | **838** | **-** |
| | | | | | | | | | | | | |
| DE/MD | 519 | Skipjack | 71.2 | | | | | 71.2 | 71 | | 71.2 | |
| DE/MD | 490 | US Wind | 71.2 | | | | | 71.2 | 71 | | 71.2 | |
| DE/MD | 482 | GSOE I | 71.2 | | | | | 71.2 | 71 | | 71.2 | |
| | | **Total DE/MD Leases** | **214** | **-** | **-** | | **-** | **213.5** | **214** | **-** | **213.5** | **-** |
| | | | | | | | | | | | | |
| VA/NC | 497 | CVOW Demonstration | 10.0 | | | | | 10.0 | 10 | | 10.0 | |
| VA/NC | 483 | CVOW | 45.8 | | | | | 45.8 | 46 | | 45.8 | |
| VA/NC | 508 | Kitty Hawk Wind | 9.5 | | | | | 9.5 | 9 | | 9.5 | |
| VA/NC | 545 | Total Energies | 9.5 | | | | | 9.5 | | | 9.5 | |
| VA/NC | 546 | Duke Energy | 9.5 | | | | | 9.5 | | | 9.5 | |
| VA/NC | 508 | Kitty Hawk South | 2.8 | | | | | 2.8 | 3 | | 2.8 | |
| | | **Total VA/NC Leases** | **87** | **-** | **-** | | **-** | **87.1** | **68** | **-** | **87.1** | **-** |
| | | | | | | | | | | | | |
| | | **Atlantic OCS Total** | **1,751** | **613** | **318** | **96** | **613** | **1,751** | **1,732** | **536** | **1,751** | **613** |
| | | ***Atlantic OCS Total Without NE Wind*** | ***1,690*** | ***552*** | ***257*** | ***35*** | ***552*** | ***1,690*** | ***1,671*** | ***475*** | ***1,690*** | ***552*** |

| | | | Anchoring Disturbance (Acres) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Region** | **Lease** | **Name** | **Overall** | **Wetlands and Waters of the US** | **Benthic** | **Cultural Resources** | **Navigation and Vessel Traffic, Recreation and Tourism, Other Resources** | **Finfish, Invertebrates, and EFH** | **Commercial Fisheries and For-hire Recreational Fishing** | **Water Quality** | **Birds, Bats, Marine Mammals, Sea Turtles** | **Demographics, Employment, and Economics; Environmental Justice;** |
| NE | NA | NE Aqua Ventus I (state waters) | NA | | | | | | - | | | |
| NE | NA | Block Island (state waters) | NA | | | | | | - | | | |
| | | **Total State Waters** | | | | | | | - | | | |
| | | | | | | | | | | | | |
| MA/RI | 501 | Vineyard Wind 1 | 4 | 4.0 | 4.0 | - | 4.0 | 4.0 | 4 | 4.0 | 4.0 | 4.0 |
| MA/RI | 517 | South Fork Wind | 820.8 | 820.8 | - | - | 820.8 | 820.8 | 821 | 820.8 | 820.8 | 820.8 |
| MA/RI | 486 | Sunrise Wind | NA | NA | NA | - | NA | NA | NA | NA | NA | NA |
| MA/RI | 487 | Revolution Wind | NA | NA | NA | - | NA | NA | NA | NA | NA | NA |
| MA/RI | 534 | New England Wind Phase 1 | 172.4 | 172.4 | 172.4 | 172.4 | 172.4 | 172.4 | 172 | 172.4 | 172.4 | 172.4 |
| MA/RI | 534 | New England Wind Phase 2 | 242.8 | 242.8 | 242.8 | 242.8 | 242.8 | 242.8 | 243 | 242.8 | 242.8 | 242.8 |
| MA/RI | 521 | Mayflower Wind | 442 | 442.0 | 147.3 | - | 442.0 | 442.0 | 442 | 442.0 | 442.0 | 442.0 |
| MA/RI | 520 | Beacon Wind | 292 | 292.4 | 292.4 | - | 292.4 | 292.4 | 292 | 292.4 | 292.4 | 292.4 |
| MA/RI | 500 | Bay State Wind | 292 | 292.4 | 292.4 | - | 292.4 | 292.4 | 292 | 292.4 | 292.4 | 292.4 |
| MA/RI | 522 | Liberty Wind (OCS-A 0522 LLC) | 292 | 292.4 | - | - | 292.4 | 292.4 | 292 | - | 292.4 | 292.4 |
| MA/RI | 520 | Remainder Beacon (0520) | 0 | - | - | - | - | - | - | - | - | - |
| | | **Total MA/RI Leases** | **2,559** | **2,559.2** | **1,151.3** | **415.2** | **2,559.2** | **2,559.2** | **2,559** | **2,266.8** | **2,559.2** | **2,559.2** |
| | | ***MA/RI Leases without NE Wind*** | ***2,144.0*** | ***2,144.0*** | ***736.1*** | ***-*** | ***2,144.0*** | ***2,144.0*** | ***2,144*** | ***1,851.6*** | ***2,144.0*** | ***2,144.0*** |
| | | | | | | | | | | | | |
| NY/NJ | 498 | Ocean Wind | 83.3 | | | | | 83.3 | 83 | | 83.3 | |
| NY/NJ | 512 | Empire Wind 1 | 53.9 | | | | | 53.9 | 54 | | 53.9 | |
| NY/NJ | 512 | Empire Wind 2 | 35.1 | | | | | 35.1 | 35 | | 35.1 | |
| NY/NJ | 499 | Atlantic Shores 1 | 263.0 | | | | | 263.0 | 263 | | 263.0 | |
| | 499 | Atlantic Shores 2 | 89.6 | | | | | 89.6 | 90 | | 89.6 | |
| NY/NJ | 532 | Ocean Wind 2 | 83.3 | | | | | 83.3 | 83 | | 83.3 | |
| NY/NJ | 549 | Atlantic Shores North | 89.6 | | | | | 89.6 | 90 | | 89.6 | |
| NY/NJ | 537 | OW Ocean Winds East OCS | 70.1 | | | | | 70.1 | 70 | | 70.1 | |
| NY/NJ | 538 | Attentive Energy | 179.2 | | | | | 179.2 | 179 | | 179.2 | |
| NY/NJ | 539 | Bight Wind Holdings | 179.2 | | | | | 179.2 | 179 | | 179.2 | |
| NY/NJ | 541 | Atlantic Shores Offshore Wind Bight | 179.2 | | | | | 179.2 | 179 | | 179.2 | |
| NY/NJ | 542 | Invenergy Wind Offshore | 179.2 | | | | | 179.2 | 179 | | 179.2 | |
| NY/NJ | 544 | Mid-Atlantic Offshore Wind | 35.1 | | | | | 35.1 | 35 | | 35.1 | |
| | | **Total NY/NJ Leases** | **1,520** | **-** | **-** | | **-** | **1,520** | **1,520** | **-** | **1,520** | **-** |
| | | | | | | | | | | | | |
| DE/MD | 519 | Skipjack | 15.6 | | | | | 15.6 | 16 | | 15.6 | |
| DE/MD | 490 | US Wind | 15.6 | | | | | 15.6 | 16 | | 15.6 | |
| DE/MD | 482 | GSOE I | 15.6 | | | | | 15.6 | 16 | | 15.6 | |
| | | **Total DE/MD Leases** | **47** | **-** | **-** | | **-** | **46.7** | **47** | **-** | **46.7** | **-** |
| | | | | | | | | | | | | |
| VA/NC | 497 | CVOW Demonstration | 3.0 | | | | | 3.0 | 3 | | 3.0 | |
| VA/NC | 483 | CVOW | 57.5 | | | | | 57.5 | 57 | | 57.5 | |
| VA/NC | 508 | Kitty Hawk Wind | 1.7 | | | | | 1.7 | 2 | | 1.7 | |
| VA/NC | 545 | Total Energies | 1.7 | | | | | 1.7 | | | 1.7 | |
| VA/NC | 546 | Duke Energy | 1.7 | | | | | 1.7 | | | 1.7 | |
| VA/NC | 508 | Kitty Hawk South | 3.2 | | | | | 3.2 | 3 | | 3.2 | |
| | | **Total VA/NC Leases** | **69** | **-** | **-** | | **-** | **68.9** | **65** | **-** | **68.9** | **-** |
| | | | | | | | | | | | | |
| | | **Atlantic OCS Total** | **4,195** | **2,559** | **1,151** | **415** | **2,559** | **4,195** | **4,191** | **2,267** | **4,195** | **2,559** |
| | | ***Atlantic OCS Total Without NE Wind*** | ***3,779*** | ***2,144*** | ***736*** | ***-*** | ***2,144*** | ***3,779*** | ***3,776*** | ***1,852*** | ***3,779*** | ***2,144*** |

| Region | Lease | Name | Inter-array + Inter-link Cable Footprint/Seabed Disruption (Acres) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **Overall** | **Wetlands and Waters of the US** | **Benthic** | **Cultural Resources** | **Navigation and Vessel Traffic, Recreation and Tourism, Other Resources** | **Finfish, Invertebrates, and EFH** | **Commercial Fisheries and For-hire Recreational Fishing** | **Water Quality** | **Birds, Bats, Marine Mammals, Sea Turtles** | **Demographics, Employment, and Economics; Environmental Justice;** |
| NE | NA | NE Aqua Ventus I (state waters) | NA | | | | | | - | | | |
| NE | NA | Block Island (state waters) | 4 | | | | | | - | | | |
| | | **Total State Waters** | | | | | | | - | | | |
| | | | | | | | | | | | | |
| MA/RI | 501 | Vineyard Wind 1 | 211.0 | 211.0 | 211.0 | - | 211.0 | 211.0 | 211 | 211.0 | 211.0 | 211.0 |
| MA/RI | 517 | South Fork Wind | 340.0 | 340.0 | - | - | 340.0 | 340.0 | 340 | 340.0 | 340.0 | 340.0 |
| MA/RI | 486 | Sunrise Wind | 2,224.0 | 2,224.0 | - | - | 2,224.0 | 2,224.0 | 2,224 | 2,224.0 | 2,224.0 | 2,224.0 |
| MA/RI | 487 | Revolution Wind | 2,619.3 | 2,619.3 | 1,047.7 | - | 2,619.3 | 2,619.3 | 2,619 | 2,619.3 | 2,619.3 | 2,619.3 |
| MA/RI | 534 | New England Wind Phase 1 | 242.0 | 242.0 | 242.0 | 242.0 | 242.0 | 242.0 | 242 | 242.0 | 242.0 | 242.0 |
| MA/RI | 534 | New England Wind Phase 2 | 380.0 | 380.0 | 380.0 | 380.0 | 380.0 | 380.0 | 380 | 380.0 | 380.0 | 380.0 |
| MA/RI | 521 | Mayflower Wind | 1,408.0 | 1,408.0 | 469.3 | - | 1,408.0 | 1,408.0 | 1,408 | 1,408.0 | 1,408.0 | 1,408.0 |
| MA/RI | 520 | Beacon Wind | 1,349.9 | 1,349.9 | 1,349.9 | - | 1,349.9 | 1,349.9 | 1,350 | 1,349.9 | 1,349.9 | 1,349.9 |
| MA/RI | 500 | Bay State Wind | 2,101.2 | 2,101.2 | 2,101.2 | - | 2,101.2 | 2,101.2 | 2,101 | 2,101.2 | 2,101.2 | 2,101.2 |
| MA/RI | 522 | Liberty Wind (OCS-A 0522 LLC) | 1,757.4 | 1,757.4 | - | - | 1,757.4 | 1,757.4 | 1,757 | - | 1,757.4 | 1,757.4 |
| MA/RI | 520 | Remainder Beacon (0520) | 649.5 | 649.5 | 649.5 | - | 649.5 | 649.5 | 649 | - | 649.5 | 649.5 |
| | | **Total MA/RI Leases** | **13,282** | **13,282.2** | **6,450.6** | **622.0** | **13,282.2** | **13,282.2** | **13,282** | **10,875.4** | **13,282.2** | **13,282.2** |
| | | ***MA/RI Leases without NE Wind*** | ***12,660.2*** | ***12,660.2*** | ***5,828.6*** | ***-*** | ***12,660.2*** | ***12,660.2*** | ***12,660*** | ***10,253.4*** | ***12,660.2*** | ***12,660.2*** |
| | | | | | | | | | | | | |
| NY/NJ | 498 | Ocean Wind | 185.0 | | | | | 185.0 | 185 | | 185.0 | |
| NY/NJ | 512 | Empire Wind 1 | 79.0 | | | | | 79.0 | 79 | | 79.0 | |
| NY/NJ | 512 | Empire Wind 2 | 99.0 | | | | | 99.0 | 99 | | 99.0 | |
| NY/NJ | 499 | Atlantic Shores 1 | 1,017.6 | | | | | 1,017.6 | 1,018 | | 1,017.6 | |
| | 499 | Atlantic Shores 2 | 1,017.6 | | | | | 1,017.6 | 1,018 | | 1,017.6 | |
| NY/NJ | 532 | Ocean Wind 2 | 271.0 | | | | | 271.0 | 271 | | 271.0 | |
| NY/NJ | 549 | Atlantic Shores North | 382.0 | | | | | 382.0 | 382 | | 382.0 | |
| NY/NJ | 537 | OW Ocean Winds East OCS | 177.6 | | | | | 177.6 | 178 | | 177.6 | |
| NY/NJ | 538 | Attentive Energy | 196.8 | | | | | 196.8 | 197 | | 196.8 | |
| NY/NJ | 539 | Bight Wind Holdings | 283.2 | | | | | 283.2 | 283 | | 283.2 | |
| NY/NJ | 541 | Atlantic Shores Offshore Wind Bight | 189.6 | | | | | 189.6 | 190 | | 189.6 | |
| NY/NJ | 542 | Invenergy Wind Offshore | 192.0 | | | | | 192.0 | 192 | | 192.0 | |
| NY/NJ | 544 | Mid-Atlantic Offshore Wind | 108.0 | | | | | 108.0 | 108 | | 108.0 | |
| | | **Total NY/NJ Leases** | **4,198** | **-** | **-** | | **-** | **4,198** | **4,198** | **-** | **4,198** | **-** |
| | | | | | | | | | | | | |
| DE/MD | 519 | Skipjack | 72.6 | | | | | 72.6 | 73 | | 72.6 | |
| DE/MD | 490 | US Wind | 72.6 | | | | | 72.6 | 73 | | 72.6 | |
| DE/MD | 482 | GSOE I | 72.6 | | | | | 72.6 | 73 | | 72.6 | |
| | | **Total DE/MD Leases** | **218** | **-** | **-** | | **-** | **217.9** | **218** | **-** | **217.9** | **-** |
| | | | | | | | | | | | | |
| VA/NC | 497 | CVOW Demonstration | 4.8 | | | | | 4.8 | 5 | | 4.8 | |
| VA/NC | 483 | CVOW | 1,176.7 | | | | | 1,176.7 | 1,177 | | 1,176.7 | |
| VA/NC | 508 | Kitty Hawk Wind | 583.1 | | | | | 583.1 | 583 | | 583.1 | |
| VA/NC | 545 | Total Energies | 583.1 | | | | | 583.1 | | | 583.1 | |
| VA/NC | 546 | Duke Energy | 583.1 | | | | | 583.1 | | | 583.1 | |
| VA/NC | 508 | Kitty Hawk South | 583.1 | | | | | 583.1 | 583 | | 583.1 | |
| | | **Total VA/NC Leases** | **3,514** | **-** | **-** | | **-** | **3,513.9** | **2,348** | **-** | **3,513.9** | **-** |
| | | | | | | | | | | | | |
| | | **Atlantic OCS Total** | **21,212** | **13,282** | **6,451** | **622** | **13,282** | **21,212** | **20,046** | **10,875** | **21,212** | **13,282** |
| | | ***Atlantic OCS Total Without NE Wind*** | ***20,590*** | ***12,660*** | ***5,829*** | ***-*** | ***12,660*** | ***20,590*** | ***19,424*** | ***10,253*** | ***20,590*** | ***12,660*** |

| | | | Inter-array + Inter-Link Cable Hard Protection (Acres) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Region** | **Lease** | **Name** | **Overall** | **Wetlands and Waters of the US** | **Benthic** | **Cultural Resources** | **Navigation and Vessel Traffic, Recreation and Tourism, Other Resources** | **Finfish, Invertebrates, and EFH; Commercial Fisheries and For-hire Recreational Fishing** | **Water Quality** | **Birds, Bats, Marine Mammals, Sea Turtles** | **Demographics, Employment, and Economics; Environmental Justice;** |
| NE | NA | NE Aqua Ventus I (state waters) | NA | | | | | | | | |
| NE | NA | Block Island (state waters) | 0.01 | | | | | | | | |
| | | **Total State Waters** | | | | | | | | | |
| | | | | | | | | | | | |
| MA/RI | 501 | Vineyard Wind 1 | 63.0 | 63.0 | 63.0 | - | 63.0 | 63.0 | 63.0 | 63.0 | 63.0 |
| MA/RI | 517 | South Fork Wind | 10.2 | 10.2 | - | - | 10.2 | 10.2 | 10.2 | 10.2 | 10.2 |
| MA/RI | 486 | Sunrise Wind | 140.4 | 140.4 | - | - | 140.4 | 140.4 | 140.4 | 140.4 | 140.4 |
| MA/RI | 487 | Revolution Wind | 78.5 | 78.5 | 31.4 | - | 78.5 | 78.5 | 78.5 | 78.5 | 78.5 |
| MA/RI | 534 | New England Wind Phase 1 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| MA/RI | 534 | New England Wind Phase 2 | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 |
| MA/RI | 521 | Mayflower Wind | 122.0 | 122.0 | 40.7 | - | 122.0 | 122.0 | 122.0 | 122.0 | 122.0 |
| MA/RI | 520 | Beacon Wind | 80.4 | 80.4 | 80.4 | - | 80.4 | 80.4 | 80.4 | 80.4 | 80.4 |
| MA/RI | 500 | Bay State Wind | 125.1 | 125.1 | 125.1 | - | 125.1 | 125.1 | 125.1 | 125.1 | 125.1 |
| MA/RI | 522 | Liberty Wind (OCS-A 0522 LLC) | 104.6 | 104.6 | - | - | 104.6 | 104.6 | - | 104.6 | 104.6 |
| MA/RI | 520 | Remainder Beacon (0520) | 38.7 | 38.7 | 38.7 | - | 38.7 | 38.7 | - | 38.7 | 38.7 |
| | | **Total MA/RI Leases** | **791** | **790.9** | **407.2** | **28.0** | **790.9** | **790.9** | **647.6** | **790.9** | **790.9** |
| | | ***MA/RI Leases without NE Wind*** | ***763*** | ***762.9*** | ***379.2*** | ***-*** | ***762.9*** | ***762.9*** | ***619.6*** | ***762.9*** | ***762.9*** |
| | | | | | | | | | | | |
| NY/NJ | 498 | Ocean Wind | 77 | | | | | 77.0 | | 77.0 | |
| NY/NJ | 512 | Empire Wind 1 | | | | | | 53.5 | | 53.5 | |
| NY/NJ | 512 | Empire Wind 2 | 53.5 | | | | | - | | - | |
| NY/NJ | 499 | Atlantic Shores 1 | 153.6 | | | | | 153.6 | | 153.6 | |
| | 499 | Atlantic Shores 2 | 153.6 | | | | | 153.6 | | 153.6 | |
| NY/NJ | 532 | Ocean Wind 2 | 86.1 | | | | | 86.1 | | 86.1 | |
| NY/NJ | 549 | Atlantic Shores North | 153.6 | | | | | 153.6 | | 153.6 | |
| NY/NJ | 537 | OW Ocean Winds East OCS | 48.3 | | | | | 48.3 | | 48.3 | |
| NY/NJ | 538 | Attentive Energy | 307.2 | | | | | 307.2 | | 307.2 | |
| NY/NJ | 539 | Bight Wind Holdings | 307.2 | | | | | 307.2 | | 307.2 | |
| NY/NJ | 541 | Atlantic Shores Offshore Wind Bight | 307.2 | | | | | 307.2 | | 307.2 | |
| NY/NJ | 542 | Invenergy Wind Offshore | 307.2 | | | | | 307.2 | | 307.2 | |
| NY/NJ | 544 | Mid-Atlantic Offshore Wind | 26.8 | | | | | 26.8 | | 26.8 | |
| | | **Total NY/NJ Leases** | **1,981** | **-** | **-** | | **-** | **1,981** | **-** | **1,981** | **-** |
| | | | | | | | | | | | |
| DE/MD | 519 | Skipjack | 7.3 | | | | | 7.3 | | 7.3 | |
| DE/MD | 490 | US Wind | 7.3 | | | | | 7.3 | | 7.3 | |
| DE/MD | 482 | GSOE I | 7.3 | | | | | 7.3 | | 7.3 | |
| | | **Total DE/MD Leases** | **22** | **-** | **-** | | **-** | **21.8** | **-** | **21.8** | **-** |
| | | | | | | | | | | | |
| VA/NC | 497 | CVOW Demonstration | - | | | | | - | | - | |
| VA/NC | 483 | CVOW | 117.6743327 | | | | | 117.7 | | 117.7 | |
| VA/NC | 508 | Kitty Hawk Wind | 14.1 | | | | | 14.1 | | 14.1 | |
| VA/NC | 545 | Total Energies | 14.1 | | | | | 14.1 | | 14.1 | |
| VA/NC | 546 | Duke Energy | 14.1 | | | | | 14.1 | | 14.1 | |
| VA/NC | 508 | Kitty Hawk South | 14.1 | | | | | 14.1 | | 14.1 | |
| | | **Total VA/NC Leases** | **174** | **-** | **-** | | **-** | **174.0** | **-** | **174.0** | **-** |
| | | | | | | | | | | | |
| | | **Atlantic OCS Total** | **2,968** | | | | | | | | |
| | | ***Atlantic OCS Total Without NE Wind*** | ***2,940*** | | | | | | | | |

| | | | Total of Coolant fluids in WTGs (gallons) | | | | | | Total Coolant fluids in ESP/OSP (gallons) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Region** | **Lease** | **Name** | **Overall** | **Air Quality** | **Cultural Resources** | **Finfish, Invertebrates, and EFH; Commercial Fisheries and For-hire Recreational Fishing** | **Water Quality** | **Birds, Bats, Marine Mammals, Sea Turtles** | **Overall** | **Air Quality** | **Cultural Resources** | **Finfish, Invertebrates, and EFH; Commercial Fisheries and For-hire Recreational Fishing** | **Water Quality** | **Birds, Bats, Marine Mammals, Sea Turtles** |
| NE | NA | NE Aqua Ventus I (state waters) | NA | | | | | | NA | | | | | |
| NE | NA | Block Island (state waters) | NA | | | | | | NA | | | | | |
| | | **Total State Waters** | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| MA/RI | 501 | Vineyard Wind 1 | 42,300 | 42,300 | - | 42,300 | 42,300 | 42,300 | 46 | 46 | - | 46 | 46 | 46 |
| MA/RI | 517 | South Fork Wind | 51,510 | - | - | 51,510 | 51,510 | 51,510 | - | - | - | - | - | - |
| MA/RI | 486 | Sunrise Wind | 418,948 | 275,893 | - | 418,948 | 418,948 | 418,948 | 40 | 26 | - | 40 | 40 | 40 |
| MA/RI | 487 | Revolution Wind | 343,400 | 40,400 | - | 343,400 | 343,400 | 343,400 | - | - | - | - | - | - |
| MA/RI | 534 | New England Wind Phase 1 | 373,426 | 373,426 | 373,426 | 373,426 | 373,426 | 373,426 | 6,340 | 6,340 | 6,340 | 6,340 | 6,340 | 6,340 |
| MA/RI | 534 | New England Wind Phase 2 | 409,564 | 409,564 | 409,564 | 409,564 | 409,564 | 409,564 | 9,510 | 9,510 | 9,510 | 9,510 | 9,510 | 9,510 |
| MA/RI | 521 | Mayflower Wind | 73,500 | 73,500 | - | 73,500 | 73,500 | 73,500 | 300 | 300 | - | 300 | 300 | 300 |
| MA/RI | 520 | Beacon Wind | 136,629 | 31,484 | - | 136,629 | 31,484 | 136,629 | 322 | 74 | - | 322 | 74 | 322 |
| MA/RI | 500 | Bay State Wind | | 49,008 | | | 49,008 | | | 116 | | | 116 | |
| MA/RI | 522 | Liberty Wind (OCS-A 0522 LLC) | | - | | | - | | | - | | | - | |
| MA/RI | 520 | Remainder Beacon (0520) | | 15,148 | | | 15,148 | | | 36 | | | 36 | |
| | | **Total MA/RI Leases** | **1,849,277** | **1,310,723** | **782,990** | **1,849,277** | **1,808,288** | **1,849,277** | **16,558** | **16,448** | **15,850** | **16,558** | **16,461** | **16,558** |
| | | ***MA/RI Leases without NE Wind*** | ***1,066,287*** | ***527,733*** | ***-*** | ***1,066,287*** | ***1,025,298*** | ***1,066,287*** | ***708*** | ***598*** | ***-*** | ***708*** | ***611*** | ***708*** |
| | | | | | | | | | | | | | | |
| NY/NJ | 498 | Ocean Wind | 39,690 | - | - | 39,690 | - | 39,690 | | - | - | - | - | - |
| NY/NJ | 512 | Empire Wind 1 | 61,912 | - | - | 61,912 | - | 61,912 | | - | - | - | - | - |
| NY/NJ | 512 | Empire Wind 2 | 89,816 | - | - | 89,816 | - | 89,816 | | - | - | - | - | - |
| NY/NJ | 499 | Atlantic Shores 1 | 820,000 | - | - | 820,000 | - | 820,000 | 10,300 | - | - | 10,300 | - | 10,300 |
| | 499 | Atlantic Shores 2 | | - | - | - | - | - | | - | - | - | - | - |
| NY/NJ | 532 | Ocean Wind 2 | 44,953 | - | - | 44,953 | - | 44,953 | | - | - | - | - | - |
| NY/NJ | 549 | Atlantic Shores North | 643,700 | - | - | 643,700 | - | 643,700 | 8,240 | - | - | 8,240 | - | 8,240 |
| NY/NJ | 537 | OW Ocean Winds East OCS | 47,790 | - | - | 47,790 | - | 47,790 | | - | - | - | - | - |
| NY/NJ | 538 | Attentive Energy | 36,450 | - | - | 36,450 | - | 36,450 | | - | - | - | - | - |
| NY/NJ | 539 | Bight Wind Holdings | 34,020 | - | - | 34,020 | - | 34,020 | | - | - | - | - | - |
| NY/NJ | 541 | Atlantic Shores Offshore Wind Bight | 38,475 | - | - | 38,475 | - | 38,475 | | - | - | - | - | - |
| NY/NJ | 542 | Invenergy Wind Offshore | 38,070 | - | - | 38,070 | - | 38,070 | | - | - | - | - | - |
| NY/NJ | 544 | Mid-Atlantic Offshore Wind | 25,515 | - | - | 25,515 | - | 25,515 | | - | - | - | - | - |
| | | **Total NY/NJ Leases** | **1,920,391** | **-** | **-** | **1,920,391** | **-** | **1,920,391** | **18,540** | **-** | **-** | **18,540** | **-** | **18,540** |
| | | | | | | | | | | | | | | |
| DE/MD | 519 | Skipjack | 6,768 | - | - | 6,768 | - | 6,768 | 46 | - | - | 46 | - | 46 |
| DE/MD | 490 | US Wind | 52,875 | - | - | 52,875 | - | 52,875 | 184 | - | - | 184 | - | 184 |
| DE/MD | 482 | GSOE I | 38,070 | - | - | 38,070 | - | 38,070 | 322 | - | - | 322 | - | 322 |
| | | **Total DE/MD Leases** | **97,713** | **-** | **-** | **97,713** | **-** | **97,713** | **552** | **-** | **-** | **552** | **-** | **552** |
| | | | | | | | | | | | | | | |
| VA/NC | 497 | CVOW Demonstration | 846 | | | | | | - | | | | | |
| VA/NC | 483 | CVOW | 86,715 | - | - | 86,715 | - | 86,715 | 69 | - | - | 69 | - | 69 |
| VA/NC | 508 | Kitty Hawk Wind | 80,370 | - | - | 80,370 | - | 80,370 | 69 | - | - | 69 | - | 69 |
| VA/NC | 545 | Total Energies | 91,910 | - | - | 91,910 | - | 91,910 | 79 | - | - | 79 | - | 79 |
| VA/NC | 546 | Duke Energy | 92,274 | - | - | 92,274 | - | 92,274 | 79 | - | - | 79 | - | 79 |
| VA/NC | 508 | Kitty Hawk South | 124,415 | - | - | 124,415 | - | 124,415 | 107 | - | - | 107 | - | 107 |
| | | **Total VA/NC Leases** | **476,530** | **-** | **-** | **475,684** | **-** | **475,684** | **403** | **-** | **-** | **403** | **-** | **403** |
| | | | | | | | | | | | | | | |
| | | **Atlantic OCS Total** | **4,343,911** | **1,310,723** | **782,990** | **4,343,065** | **1,808,288** | **4,343,065** | **36,053** | **16,448** | **15,850** | **36,053** | **16,461** | **36,053** |
| | | ***Atlantic OCS Total Without NE Wind*** | ***3,560,921*** | ***527,733*** | ***-*** | ***3,560,075*** | ***1,025,298*** | ***3,560,075*** | ***20,203*** | ***598*** | ***-*** | ***20,203*** | ***611*** | ***20,203*** |

| | | | Total Volume of Oils and Lubricants in WTGs (gallons) | | | | | | Total Oils and Lubricants in ESP/OSP (gallons) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Region** | **Lease** | **Name** | **Overall** | **Air Quality** | **Cultural Resources** | **Finfish, Invertebrates, and EFH; Commercial Fisheries and For-hire Recreational Fishing** | **Water Quality** | **Birds, Bats, Marine Mammals, Sea Turtles** | **Overall** | **Air Quality** | **Cultural Resources** | **Finfish, Invertebrates, and EFH** | **Commercial Fisheries and For-hire Recreational Fishing** | **Water Quality** | **Birds, Bats, Marine Mammals, Sea Turtles** |
| NE | NA | NE Aqua Ventus I (state waters) | NA | | | | | | NA | | | | - | | |
| NE | NA | Block Island (state waters) | NA | | | | | | NA | | | | - | | |
| | | **Total State Waters** | | | | | | | | | | | - | | |
| | | | | | | | | | | | | | | | |
| MA/RI | 501 | Vineyard Wind 1 | 383,000 | 383,000 | - | 383,000 | 383,000 | 383,000 | 123,559 | 123,559 | - | 123,559 | 123,559 | 123,559 | 123,559 |
| MA/RI | 517 | South Fork Wind | 968,580 | - | - | 968,580 | 968,580 | 968,580 | 79,569 | - | - | 79,569 | 79,569 | 79,569 | 79,569 |
| MA/RI | 486 | Sunrise Wind | 402,966 | 265,368 | - | 402,966 | 402,966 | 402,966 | 109,570 | 72,156 | - | 109,570 | 109,570 | 109,570 | 109,570 |
| MA/RI | 487 | Revolution Wind | 330,300 | 38,859 | - | 330,300 | 330,300 | 330,300 | 159,138 | 18,722 | - | 159,138 | 159,138 | 159,138 | 159,138 |
| MA/RI | 534 | New England Wind Phase 1 | 591,542 | 591,542 | 591,542 | 591,542 | 591,542 | 591,542 | 355,556 | 355,556 | 355,556 | 355,556 | 355,556 | 355,556 | 355,556 |
| MA/RI | 534 | New England Wind Phase 2 | 648,788 | 648,788 | 648,788 | 648,788 | 648,788 | 648,788 | 533,334 | 533,334 | 533,334 | 533,334 | 533,334 | 533,334 | 533,334 |
| MA/RI | 521 | Mayflower Wind | 433,650 | 433,650 | - | 433,650 | 433,650 | 433,650 | 153,000 | 153,000 | - | 153,000 | 153,000 | 153,000 | 153,000 |
| MA/RI | 520 | Beacon Wind | 1,237,090 | 285,069 | - | 1,237,090 | 285,069 | 1,237,090 | 864,913 | 199,306 | - | 864,913 | 864,913 | 199,306 | 864,913 |
| MA/RI | 500 | Bay State Wind | | 443,739 | | | 443,739 | | | 310,241 | | | - | 310,241 | |
| MA/RI | 522 | Liberty Wind (OCS-A 0522 LLC) | | - | | | - | | | - | | | - | - | |
| MA/RI | 520 | Remainder Beacon (0520) | | 137,156 | | | 137,156 | | | 95,893 | | | - | 95,893 | |
| | | **Total MA/RI Leases** | **4,995,916** | **3,227,170** | **1,240,330** | **4,995,916** | **4,624,789** | **4,995,916** | **2,378,639** | **1,861,766** | **888,890** | **2,378,639** | **2,378,639** | **2,119,165** | **2,378,639** |
| | | ***MA/RI Leases without NE Wind*** | ***3,755,586*** | ***1,986,840*** | ***-*** | ***3,755,586*** | ***3,384,459*** | ***3,755,586*** | ***1,489,749*** | ***972,876*** | ***-*** | ***1,489,749*** | ***1,489,749*** | ***1,230,275*** | ***1,489,749*** |
| | | | | | | | | | | | | | | | |
| NY/NJ | 498 | Ocean Wind | 187,964 | - | - | 187,964 | - | 187,964 | 238,707 | - | - | 238,707 | 238,707 | - | 238,707 |
| NY/NJ | 512 | Empire Wind 1 | 290,177 | - | - | 290,177 | - | 290,177 | 105,669 | - | - | 105,669 | 105,669 | - | 105,669 |
| NY/NJ | 512 | Empire Wind 2 | 420,961 | - | - | 420,961 | - | 420,961 | 158,503 | - | - | 158,503 | 158,503 | - | 158,503 |
| NY/NJ | 499 | Atlantic Shores 1 | 606,200 | - | - | 606,200 | - | 606,200 | 370,050 | - | - | 370,050 | 370,050 | - | 370,050 |
| | 499 | Atlantic Shores 2 | | - | - | - | - | - | | - | - | - | - | - | - |
| NY/NJ | 532 | Ocean Wind 2 | 212,888 | - | - | 212,888 | - | 212,888 | 160,732 | - | - | 160,732 | 160,732 | - | 160,732 |
| NY/NJ | 549 | Atlantic Shores North | 475,867 | - | - | 475,867 | - | 475,867 | 296,040 | - | - | 296,040 | 296,040 | - | 296,040 |
| NY/NJ | 537 | OW Ocean Winds East OCS | 226,324 | - | - | 226,324 | - | 226,324 | 287,423 | - | - | 287,423 | 287,423 | - | 287,423 |
| NY/NJ | 538 | Attentive Energy | 172,620 | - | - | 172,620 | - | 172,620 | 219,221 | - | - | 219,221 | 219,221 | - | 219,221 |
| NY/NJ | 539 | Bight Wind Holdings | 161,112 | - | - | 161,112 | - | 161,112 | 204,606 | - | - | 204,606 | 204,606 | - | 204,606 |
| NY/NJ | 541 | Atlantic Shores Offshore Wind Bight | 182,210 | - | - | 182,210 | - | 182,210 | 231,400 | - | - | 231,400 | 231,400 | - | 231,400 |
| NY/NJ | 542 | Invenergy Wind Offshore | 180,292 | - | - | 180,292 | - | 180,292 | 228,964 | - | - | 228,964 | 228,964 | - | 228,964 |
| NY/NJ | 544 | Mid-Atlantic Offshore Wind | 120,834 | - | - | 120,834 | - | 120,834 | 153,455 | - | - | 153,455 | 153,455 | - | 153,455 |
| | | **Total NY/NJ Leases** | **3,237,449** | **-** | **-** | **3,237,449** | **-** | **3,237,449** | **2,654,770** | **-** | **-** | **2,654,770** | **2,654,770** | **-** | **2,654,770** |
| | | | | | | | | | | | | | | | |
| DE/MD | 519 | Skipjack | 61,280 | - | - | 61,280 | - | 61,280 | 61,780 | - | - | 61,780 | 61,780 | - | 61,780 |
| DE/MD | 490 | US Wind | 478,750 | - | - | 478,750 | - | 478,750 | 247,118 | - | - | 247,118 | 247,118 | - | 247,118 |
| DE/MD | 482 | GSOE I | 344,700 | - | - | 344,700 | - | 344,700 | 185,339 | - | - | 185,339 | 185,339 | - | 185,339 |
| | | **Total DE/MD Leases** | **884,730** | **-** | **-** | **884,730** | **-** | **884,730** | **494,237** | **-** | **-** | **494,237** | **494,237** | **-** | **494,237** |
| | | | | | | | | | | | | | | | |
| VA/NC | 497 | CVOW Demonstration | 7,660 | | | | | | - | | | | - | | |
| VA/NC | 483 | CVOW | 785,150 | - | - | 785,150 | - | 785,150 | 185,339 | - | - | 185,339 | 185,339 | - | 185,339 |
| VA/NC | 508 | Kitty Hawk Wind | 727,700 | - | - | 727,700 | - | 727,700 | 185,339 | - | - | 185,339 | 185,339 | - | 185,339 |
| VA/NC | 545 | Total Energies | 832,192 | - | - | 832,192 | - | 832,192 | 211,952 | - | - | 211,952 | | - | 211,952 |
| VA/NC | 546 | Duke Energy | 835,479 | - | - | 835,479 | - | 835,479 | 212,789 | - | - | 212,789 | | - | 212,789 |
| VA/NC | 508 | Kitty Hawk South | 1,126,504 | - | - | 1,126,504 | - | 1,126,504 | 286,911 | - | - | 286,911 | 286,911 | - | 286,911 |
| | | **Total VA/NC Leases** | **4,314,685** | **-** | **-** | **4,307,025** | **-** | **4,307,025** | **1,082,331** | **-** | **-** | **1,082,331** | **657,589** | **-** | **1,082,331** |
| | | | | | | | | | | | | | | | |
| | | **Atlantic OCS Total** | **13,432,780** | **3,227,170** | **1,240,330** | **13,425,120** | **4,624,789** | **13,425,120** | **6,609,976** | **1,861,766** | **888,890** | **6,609,976** | **6,185,235** | **2,119,165** | **6,609,976** |
| | | ***Atlantic OCS Total Without NE Wind*** | ***12,192,450*** | ***1,986,840*** | ***-*** | ***12,184,790*** | ***3,384,459*** | ***12,184,790*** | ***5,721,086*** | ***972,876*** | ***-*** | ***5,721,086*** | ***5,296,345*** | ***1,230,275*** | ***5,721,086*** |

| Region | Lease | Name | Total Diesel Fuel in WTGs (gallons) | | | | | | | Total Volume of Diesel Fuel in ESP/OSP (gallons) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Overall | Air Quality | Cultural Resources | Finfish, Invertebrates, and EFH | Commercial Fisheries and For-hire Recreational Fishing | Water Quality | Birds, Bats, Marine Mammals, Sea Turtles | Overall | Air Quality | Cultural Resources | Finfish, Invertebrates, and EFH | Commercial Fisheries and For-hire Recreational Fishing | Water Quality | Birds, Bats, Marine Mammals, Sea Turtles |
| NE | NA | NE Aqua Ventus I (state waters) | NA | | | | - | | | NA | | | | - | | |
| NE | NA | Block Island (state waters) | NA | | | | - | | | NA | | | | - | | |
| | | **Total State Waters** | | | | | - | | | | | | | - | | |
| | | | | | | | | | | | | | | | | |
| MA/RI | 501 | Vineyard Wind 1 | 79,300 | 79,300 | - | 79,300 | 79,300 | 79,300 | 79,300 | 5,696 | 5,696 | - | 5,696 | 5,696 | 5,696 | 5,696 |
| MA/RI | 517 | South Fork Wind | 11,895 | - | - | 11,895 | 11,895 | 11,895 | 11,895 | 52,834 | - | - | 52,834 | 52,834 | 52,834 | 52,834 |
| MA/RI | 486 | Sunrise Wind | 96,746 | 63,711 | - | 96,746 | 96,746 | 96,746 | 96,746 | 24,304 | 16,005 | - | 24,304 | 24,304 | 24,304 | 24,304 |
| MA/RI | 487 | Revolution Wind | 79,300 | 9,329 | - | 79,300 | 79,300 | 79,300 | 79,300 | 105,668 | 12,432 | - | 105,668 | 105,668 | 105,668 | 105,668 |
| MA/RI | 534 | New England Wind Phase 1 | 114,638 | 114,638 | 114,638 | 114,638 | 114,638 | 114,638 | 114,638 | 16,402 | 16,402 | 16,402 | 16,402 | 16,402 | 16,402 | 16,402 |
| MA/RI | 534 | New England Wind Phase 2 | 125,732 | 125,732 | 125,732 | 125,732 | 125,732 | 125,732 | 125,732 | 24,603 | 24,603 | 24,603 | 24,603 | 24,603 | 24,603 | 24,603 |
| MA/RI | 521 | Mayflower Wind | 900 | 900 | - | 900 | 900 | 900 | 900 | 40,000 | 40,000 | - | 40,000 | 40,000 | 40,000 | 40,000 |
| MA/RI | 520 | Beacon Wind | 256,139 | 59,023 | - | 256,139 | 256,139 | 59,023 | 256,139 | 39,872 | 9,188 | - | 39,872 | 39,872 | 9,188 | 39,872 |
| MA/RI | 500 | Bay State Wind | | 91,876 | | | - | 91,876 | | | 14,302 | | | - | 14,302 | |
| MA/RI | 522 | Liberty Wind (OCS-A 0522 LLC) | | - | | | - | - | | | - | | | - | - | |
| MA/RI | 520 | Remainder Beacon (0520) | | 28,398 | | | - | 28,398 | | | 4,421 | | | - | 4,421 | |
| | | **Total MA/RI Leases** | **764,650** | **572,907** | **240,370** | **764,650** | **764,650** | **687,808** | **764,650** | **309,379** | **143,048** | **41,005** | **309,379** | **309,379** | **297,417** | **309,379** |
| | | ***MA/RI Leases without NE Wind*** | ***524,280*** | ***332,537*** | ***-*** | ***524,280*** | ***524,280*** | ***447,438*** | ***524,280*** | ***268,374*** | ***102,043*** | ***-*** | ***268,374*** | ***268,374*** | ***256,412*** | ***268,374*** |
| | | | | | | | | | | | | | | | | |
| NY/NJ | 498 | Ocean Wind | 77,714 | - | - | 77,714 | 77,714 | - | 77,714 | 158,502 | - | - | 158,502 | 158,502 | - | 158,502 |
| NY/NJ | 512 | Empire Wind 1 | | - | - | - | - | - | - | 105,673 | - | - | 105,673 | 105,673 | - | 105,673 |
| NY/NJ | 512 | Empire Wind 2 | | - | - | - | - | - | - | 6,604 | - | - | 6,604 | 6,604 | - | 6,604 |
| NY/NJ | 499 | Atlantic Shores 1 | 80,000 | - | - | 80,000 | 80,000 | - | 80,000 | 75,000 | - | - | 75,000 | 75,000 | - | 75,000 |
| | 499 | Atlantic Shores 2 | | - | - | - | - | - | - | | - | - | - | - | - | - |
| NY/NJ | 532 | Ocean Wind 2 | 88,019 | - | - | 88,019 | 88,019 | - | 88,019 | 105,673 | - | - | 105,673 | 105,673 | - | 105,673 |
| NY/NJ | 549 | Atlantic Shores North | 62,800 | - | - | 62,800 | 62,800 | - | 62,800 | 60,000 | - | - | 60,000 | 60,000 | - | 60,000 |
| NY/NJ | 537 | OW Ocean Winds East OCS | 93,574 | - | - | 93,574 | 93,574 | - | 93,574 | 190,849 | - | - | 190,849 | 190,849 | - | 190,849 |
| NY/NJ | 538 | Attentive Energy | 71,370 | - | - | 71,370 | 71,370 | - | 71,370 | 145,563 | - | - | 145,563 | 145,563 | - | 145,563 |
| NY/NJ | 539 | Bight Wind Holdings | 66,612 | - | - | 66,612 | 66,612 | - | 66,612 | 135,859 | - | - | 135,859 | 135,859 | - | 135,859 |
| NY/NJ | 541 | Atlantic Shores Offshore Wind Bight | 75,335 | - | - | 75,335 | 75,335 | - | 75,335 | 153,650 | - | - | 153,650 | 153,650 | - | 153,650 |
| NY/NJ | 542 | Invenergy Wind Offshore | 74,542 | - | - | 74,542 | 74,542 | - | 74,542 | 152,033 | - | - | 152,033 | 152,033 | - | 152,033 |
| NY/NJ | 544 | Mid-Atlantic Offshore Wind | 49,959 | - | - | 49,959 | 49,959 | - | 49,959 | 101,894 | - | - | 101,894 | 101,894 | - | 101,894 |
| | | **Total NY/NJ Leases** | **739,925** | **-** | **-** | **739,925** | **739,925** | **-** | **739,925** | **1,391,300** | **-** | **-** | **1,391,300** | **1,391,300** | **-** | **1,391,300** |
| | | | | | | | | | | | | | | | | |
| DE/MD | 519 | Skipjack | 12,688 | - | - | 12,688 | 12,688 | - | 12,688 | 2,848 | - | - | 2,848 | 2,848 | - | 2,848 |
| DE/MD | 490 | US Wind | 99,125 | - | - | 99,125 | 99,125 | - | 99,125 | 11,392 | - | - | 11,392 | 11,392 | - | 11,392 |
| DE/MD | 482 | GSOE I | 71,370 | - | - | 71,370 | 71,370 | - | 71,370 | 8,544 | - | - | 8,544 | 8,544 | - | 8,544 |
| | | **Total DE/MD Leases** | **183,183** | **-** | **-** | **183,183** | **183,183** | **-** | **183,183** | **22,784** | **-** | **-** | **22,784** | **22,784** | **-** | **22,784** |
| | | | | | | | | | | | | | | | | |
| VA/NC | 497 | CVOW Demonstration | 1,586 | | | | - | | | - | | | | - | | |
| VA/NC | 483 | CVOW | 162,565 | - | - | 162,565 | 162,565 | - | 162,565 | 8,544 | - | - | 8,544 | 8,544 | - | 8,544 |
| VA/NC | 508 | Kitty Hawk Wind | 150,670 | - | - | 150,670 | 150,670 | - | 150,670 | 8,544 | - | - | 8,544 | 8,544 | - | 8,544 |
| VA/NC | 545 | Total Energies | 172,305 | - | - | 172,305 | | - | 172,305 | 9,771 | - | - | 9,771 | | - | 9,771 |
| VA/NC | 546 | Duke Energy | 172,986 | - | - | 172,986 | | - | 172,986 | 9,809 | - | - | 9,809 | | - | 9,809 |
| VA/NC | 508 | Kitty Hawk South | 233,242 | - | - | 233,242 | 233,242 | - | 233,242 | 13,226 | - | - | 13,226 | 13,226 | - | 13,226 |
| | | **Total VA/NC Leases** | **893,354** | **-** | **-** | **891,768** | **546,477** | **-** | **891,768** | **49,895** | **-** | **-** | **49,895** | **30,314** | **-** | **49,895** |
| | | | | | | | | | | | | | | | | |
| | | **Atlantic OCS Total** | **2,581,112** | **572,907** | **240,370** | **2,579,526** | **2,234,235** | **687,808** | **2,579,526** | **1,773,358** | **143,048** | **41,005** | **1,773,358** | **1,753,777** | **297,417** | **1,773,358** |
| | | ***Atlantic OCS Total Without NE Wind*** | ***2,340,742*** | ***332,537*** | ***-*** | ***2,339,156*** | ***1,993,865*** | ***447,438*** | ***2,339,156*** | ***1,732,353*** | ***102,043*** | ***-*** | ***1,732,353*** | ***1,712,772*** | ***256,412*** | ***1,732,353*** |

| | | | Construction Emissions (tons) | | | | | | | | Operations Emissions (tons per year) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Region** | **Lease** | **Name** | **NOx** | **VOC** | **CO** | **$PM_{10}$** | **$PM_{2.5}$** | **$SO_2$** | **HAP** | **$CO_2e$** | **NOx** | **VOC** | **CO** | **$PM_{10}$** | **$PM_{2.5}$** | **$SO_2$** | **HAP** | **$CO_2e$** |
| NE | NA | NE Aqua Ventus I (state waters) | NA | NA | NA | NA | NA | NA | NA | | NA | NA | NA | NA | NA | NA | | NA |
| NE | NA | Block Island (state waters) | NA | NA | NA | NA | NA | NA | NA | | NA | NA | NA | NA | NA | NA | | NA |
| | | **Total State Waters** | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| MA/RI | 501 | Vineyard Wind 1 | 4,961.0 | 121.5 | 1,115.7 | 172.4 | 165.7 | 38.3 | | 318,660.0 | 70.8 | 2.0 | 18.1 | 2.4 | 2.3 | 0.3 | | 5,487.0 |
| MA/RI | 517 | South Fork Wind | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| MA/RI | 486 | Sunrise Wind | 1,378.2 | 32.3 | 572.5 | 25.4 | 25.4 | 1.4 | | 149,639.3 | 121.0 | 2.8 | 50.2 | 2.2 | 2.2 | 0.1 | | 13,141.1 |
| MA/RI | 487 | Revolution Wind | 4,124.1 | 85.4 | 1,007.6 | 134.5 | 130.0 | 13.2 | | 278,696.0 | 1,053.0 | 15.4 | 258.8 | 34.3 | 33.3 | 0.7 | | 72,326.0 |
| MA/RI | 534 | New England Wind Phase 1 | 5,917.0 | 124.0 | 1,406.0 | 238.0 | 230.0 | 41.0 | 18.0 | 393,627.0 | 178.0 | 3.2 | 45.0 | 6.0 | 5.8 | 0.5 | 0.5 | 20,259.0 |
| MA/RI | 534 | New England Wind Phase 2 | 7,732.0 | 164.0 | 1,841.0 | 339.0 | 329.0 | 54.0 | 24.0 | 520,958.0 | 179.0 | 3.2 | 45.0 | 6.0 | 5.8 | 0.5 | 0.5 | 27,594.0 |
| MA/RI | 521 | Mayflower Wind | 8,278.2 | 181.0 | 2,040.3 | 312.2 | 302.2 | 50.8 | | 570,450.4 | 549.9 | 9.1 | 143.2 | 17.5 | 17.0 | 0.7 | | 47,655.0 |
| MA/RI | 520 | Beacon Wind | 5,889.2 | 128.8 | 1,451.5 | 222.1 | 215.0 | 36.1 | | 405,823.8 | 391.2 | 6.5 | 101.9 | 12.4 | 12.1 | 0.5 | | 33,902.2 |
| MA/RI | 500 | Bay State Wind | 9,167.1 | 200.4 | 2,259.4 | 345.7 | 334.6 | 56.2 | | 631,706.8 | 609.0 | 10.1 | 158.6 | 19.4 | 18.8 | 0.8 | | 52,772.3 |
| MA/RI | 522 | Liberty Wind (OCS-A 0522 LLC) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| MA/RI | 520 | Remainder Beacon (0520) | 2,833.5 | 62.0 | 698.4 | 106.9 | 103.4 | 17.4 | | 195,254.8 | 188.2 | 3.1 | 49.0 | 6.0 | 5.8 | 0.3 | | 16,311.4 |
| | | **Total MA/RI Leases** | **50,280** | **1,099** | **12,392** | **1,896** | **1,835** | **308** | | **3,464,816** | **3,340** | **56** | **870** | **106** | **103** | **4** | | **289,448** |
| | | ***MA/RI Leases without NE Wind*** | ***36,631*** | ***811*** | ***9,145*** | ***1,319*** | ***1,276*** | ***213*** | | ***2,550,231*** | ***2,983*** | ***49*** | ***780*** | ***94*** | ***91*** | ***3*** | | ***241,595*** |
| | | | | | | | | | | | | | | | | | | |
| NY/NJ | 498 | Ocean Wind | | | | | | | | | | | | | | | | |
| NY/NJ | 512 | Empire Wind 1 | | | | | | | | | | | | | | | | |
| NY/NJ | 512 | Empire Wind 2 | | | | | | | | | | | | | | | | |
| NY/NJ | 499 | Atlantic Shores 1 | | | | | | | | | | | | | | | | |
| | 499 | Atlantic Shores 2 | | | | | | | | | | | | | | | | |
| NY/NJ | 532 | Ocean Wind 2 | | | | | | | | | | | | | | | | |
| NY/NJ | 549 | Atlantic Shores North | | | | | | | | | | | | | | | | |
| NY/NJ | 537 | OW Ocean Winds East OCS | | | | | | | | | | | | | | | | |
| NY/NJ | 538 | Attentive Energy | | | | | | | | | | | | | | | | |
| NY/NJ | 539 | Bight Wind Holdings | | | | | | | | | | | | | | | | |
| NY/NJ | 541 | Atlantic Shores Offshore Wind Bight | | | | | | | | | | | | | | | | |
| NY/NJ | 542 | Invenergy Wind Offshore | | | | | | | | | | | | | | | | |
| NY/NJ | 544 | Mid-Atlantic Offshore Wind | | | | | | | | | | | | | | | | |
| | | **Total NY/NJ Leases** | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| DE/MD | 519 | Skipjack | | | | | | | | | | | | | | | | |
| DE/MD | 490 | US Wind | | | | | | | | | | | | | | | | |
| DE/MD | 482 | GSOE I | | | | | | | | | | | | | | | | |
| | | **Total DE/MD Leases** | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| VA/NC | 497 | CVOW Demonstration | | | | | | | | | | | | | | | | |
| VA/NC | 483 | CVOW | | | | | | | | | | | | | | | | |
| VA/NC | 508 | Kitty Hawk Wind | | | | | | | | | | | | | | | | |
| VA/NC | 545 | Total Energies | | | | | | | | | | | | | | | | |
| VA/NC | 546 | Duke Energy | | | | | | | | | | | | | | | | |
| VA/NC | 508 | Kitty Hawk South | | | | | | | | | | | | | | | | |
| | | **Total VA/NC Leases** | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | **Atlantic OCS Total** | **50,280** | **1,099** | **12,392** | **1,896** | **1,835** | **308** | | | **3,340** | **56** | **870** | **106** | **103** | **4** | | **289,448** |
| | | ***Atlantic OCS Total Without NE Wind*** | ***36,631*** | ***811*** | ***9,145*** | ***1,319*** | ***1,276*** | ***213*** | | | ***2,983*** | ***49*** | ***780*** | ***94*** | ***91*** | ***3*** | | ***241,595*** |

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The 28 active wind energy lease areas on the Atlantic OCS cover approximately 2,232,507 acres with a total technical capacity of about 35 GW (Musial et al. 2021). This capacity is greater than the 22 GW estimated in the Final EIS for the Vineyard Wind 1 Project [BOEM 2021]) and greater than the 30 GW assumed by BOEM for purposes of this EIS. This capacity would represent greater offtake (i.e., contracted use of power by states and other entities) than is presently planned by Atlantic states and may also reflect industry expectations of increasing available wind turbine generators (WTG) capacities (Musial et al. 2021). Unsuitable geological conditions identified during site characterization surveys, potential use conflicts, habitat resource concerns, endangered species impacts, and future navigation corridors identified by the U.S. Coast Guard (USCG) could exclude significant portions of the leases from development. Therefore, it is improbable that active Atlantic leases will be developed to their maximum technical capacity due to unsuitable conditions.

State pledges for offshore wind capacity currently total about 39 GW by 2040 (Musial et al. 2021), including awarded, scheduled, and planned but unscheduled procurements. This total capacity is specific to offshore wind and does not include more general renewable or clean energy goals. Out of the three categories of commitments, offtake awards provide the greatest certainty for development, followed by announced, scheduled solicitations. State goals that are planned but do not have scheduled award or procurement dates could occur as a series of procurements, or simply not be met if future cost reductions do not meet the states' award criteria. Some states have clauses requiring state boards or commissions to approve offshore wind procurements only if determined in the public interest or in the best interest of ratepayers. If offshore wind offtake is not awarded due to the cost of offshore wind subsidies or for other reasons, the planned state procurements would not be fully realized. Furthermore, state commitments for offshore wind development may not be met for lack of available lease area or technical capacity.

The following sections describe reasonably foreseeable activities associated with offshore wind development on the Atlantic OCS and identify the development status of proposed offshore wind projects. These include site characterization studies, site assessment activities, construction and operation of offshore wind facilities, port upgrades, and construction and maintenance of offshore export cables. These sections also identify assumptions and mitigation and monitoring measures used to evaluate potential impacts in the geographic analysis areas identified for each resource evaluated in this EIS.

### E.3.1 Assumptions

The analysis of the planned activities scenario for each resource evaluated in this EIS incorporates the assumptions listed below.

- The developers of the offshore wind projects in the Rhode Island and Massachusetts Lease Areas (RI/MA Lease Areas) have agreed to construct WTGs and electrical service platforms (ESP) in an east-to-west, north to-south grid pattern with 1 nautical mile (1.9 kilometers, 1.15 miles) × 1 nautical mile (1.9 kilometers, 1.15 miles) east-west and north-south spacing between positions.
- Where applicants have identified specific WTG models, the characteristics of those WTGs have been incorporated into this analysis. Where a project-specific COP has identified a project design envelope, the planned activities scenario reflects the maximum-case scenario for each affected resource. For projects with no published COP, BOEM's analysis includes assumptions about the WTG characteristics that would represent the likely maximum-case scenario for each project, based on WTG characteristics of projects proposed by the same developer, as well as the characteristics of WTGs from adjacent projects.
- The simultaneous construction of multiple projects on the Atlantic OCS would require a substantial number of specialized vessels and a robust supply chain. The planned activities scenario assumes the challenges of vessel availability and supply chain will be overcome, and projects will advance at the schedule the states and developers have announced.

- BOEM assumes that all planned offshore wind procurements will be awarded, even for those states that have clauses requiring state boards or commissions to only approve offshore wind procurements if determined in the public interest or in the best interest of ratepayers. If any offshore wind agreements are not awarded, fewer projects will be developed than BOEM foresees.
- Some states might include technical, economic, or environmental stipulations in their offshore wind solicitations that are too burdensome for prospective developers; this would reduce BOEM's build-out scenario.
- Infrastructure does not currently exist to handle interconnection points and transmission for all Atlantic offshore wind energy. BOEM assumes these challenges will be solved and that sufficient infrastructure will be built to accommodate all energy generated by Atlantic offshore wind. This analysis does not address potential solutions, although independent transmission proposals dedicated to offshore wind energy could assist.
- BOEM assumes that each offshore wind project would have its own offshore export cable and that regional transmission projects are not currently foreseeable. If a shared export cable becomes feasible and is developed in the future, environmental impacts would be reduced for most resources as compared to multiple cable corridors.
- EIS Section E.3.2 details BOEM's technical assumptions regarding the design and placements of potential future project elements (e.g., WTGs, cables). This appendix also specifies BOEM's assumptions related to the anticipated timing of reasonably foreseeable offshore wind activities from 2022 through 2030, some of which would overlap in time. The assumptions outlined are used in evaluating potential planned activities impacts on the resources analyzed in this document.
- Each resource has a geographic distribution, and these differ in the areas that may be affected by the proposed Project (Table D-1 in EIS Appendix D, Geographical Analysis Areas). Figures in EIS Sections 3.4 through 3.17 identify the resource-specific geographic analysis areas. Table E-1 identifies whether these projects or activities are located within particular resource-specific analysis areas and thus are considered in the EIS impacts analysis.

### E.3.2 Site Characterization Studies

A lessee is required to provide the results of site characterization activities (shallow hazard, geological, geotechnical, biological, and archaeological surveys) with its Site Assessment Plan (SAP) or COP. The planned activities analysis in this appendix includes BOEM's assumptions—listed below—about the maximum-case scenario for survey and sampling activities.

- Site characterization would occur on all existing leases and potential export cable routes.
- Site characterization would likely take place in the first 3 years following execution of the lease, based on the fact that 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 a meteorological (met) tower and/or two buoys and commercial facilities (wind turbines). The surveys may be completed in phases, with the met 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 describes the typical site characterization surveys, equipment and/or method used, and which resources the survey information would inform.

**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,[a] archaeological,[b] bathymetric charting, benthic habitat |
| Geotechnical/sub-bottom sampling[c] | Vibracores, deep borings, cone penetration tests | Geological,[d] marine archaeology |
| Biological[e] | Grab sampling, benthic sled, underwater imagery/sediment profile imaging | Benthic habitat |
| | Aerial digital imaging; visual observation from boat or airplane | Avian, marine mammals, sea turtles |
| | 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 and invertebrates |

Source: BOEM 2016

[a] 30 CFR § 585.610(b)(2) and 30 CFR § 585.626(a)(1)
[b] 30 CFR § 585.610–585.611 and 30 CFR § 585.626(a)(5)
[c] 30 CFR § 585.610(b)(1) and 30 CFR § 585.626(a)(4)
[d] 30 CFR § 585.610(b)(4) and 30 CFR § 585.626(a)(2)
[e] 30 CFR § 585.610(b)(5), 30 CFR § 585.611(b)(3)-(5), 30 CFR § 585.626(a)(3), and 30 CFR § 585.627(a)(3-5)

### E.3.3 Site Assessment Activities

After SAP approval, a lessee can evaluate the met conditions, such as wind resources, with the approved installation of met towers, buoys, or moorings. For those lessees with submitted SAPs (Table E-3), site assessment activities are also considered in this planned activities analysis.

### E.3.4 Construction and Operation of Offshore Wind Facilities

For purposes of this planned activities analysis, BOEM is classifying 30 GW of potential future offshore wind construction within the Atlantic OCS as reasonably foreseeable. The 30 GW of constructed capacity would include a combination of development within the 28 active wind energy lease areas (27 commercial and 1 research) (Figure E-1), which include named projects and assumed future development within the remainder of lease areas outside of named project boundaries. A detailed description of proposed activities associated with each named project and remnant lease areas is provided in Table E-1. Figures in each of the resource sections in EIS Chapter 3 and Section G.2 of EIS Appendix G, Impact-Producing Factor Tables and Assessment of Resources with Minor (or Lower) Impacts, show the geographic analysis area for each resource evaluated. The specific locations of WTGs, ESPs, offshore export cable routes, principal ports to be used during construction, and principal ports to be used during operations and maintenance are unknown for projects in the early stage of development. Some similar information is also unknown for areas of offshore wind development required to meet the energy demands described in EIS Chapter 1, Introduction, within existing lease areas but outside of specifically named project boundaries. Therefore, when predicting the potential impacts of possible future offshore wind activities, BOEM has made assumptions to determine whether and how much the future offshore wind activities could overlap each geographic analysis area (described below and listed in Table E-1).

The anticipated construction schedule of when projects in the different regions would foreseeably start construction is presented in Table E-4.

**Table E-3: Planned Activities Project Site Assessment Activities**

| Lease Number | State | Company Name | Initial Date SAP Received | Date SAP Approved | Date Deployed or to be Deployed | Facility Description |
|---|---|---|---|---|---|---|
| OCS-A 0482 | Delaware | Garden State Offshore Energy I, LLC (Deepwater Wind and Public Service Enterprise Group) | 7/2018 | 12/6/2019 | Deployed, 1/20/2020 | One met buoy |
| OCS-A 0483 | Virginia | Dominion Energy Services, Inc. | 5/2014 | 10/12/2017 | 2nd Quarter 2019 | One met buoy |
| OCS-A 0486 and OCS-A 0517 | Rhode Island and Massachusetts | Deepwater Wind New England, LLC | 4/1/2016 | 10/12/2017 | 1/17/2019 | One met buoy |
| OCS-A 0490 | Maryland | US Wind, Inc. | 11/2015 | 3/22/2018 | 8/2018 | One met tower, seabed mountain sensors |
| OCS-A 0497 | Virginia | Virginia Department of Mines, Minerals and Energy/Dominion Energy Services, Inc. | 12/2014[a] | 6/20/2019[a] | March–October 2020 | One wave/current buoy |
| OCS-A 0498 | New Jersey | OceanWind LLC | 9/15/2017 | 5/16/2018 | 8/20/2018 | Two met buoys, one met/current buoy |
| OCS-A 0499 | New Jersey | EDF Renewables Development, Inc. | 12/9/2019 | TBD | TBD | Two met buoys |
| OCS-A 0500 | Massachusetts | Bay State Wind | 12/20/2016 | 6/29/2017 | 7/10/2017 | Two met buoys |
| OCS-A 0501 | Massachusetts | Vineyard Wind, LLC | 3/31/2017 | 5/10/2018 | 5/22/2018 | Two met buoys |
| OCS-A 0508 | North Carolina | Avangrid Renewables, LLC | 9/18/2019 | 4/3/2020 | 6/6/2020 | Up to two buoys and up to two platforms |
| OCS-A 0512 | New York | Equinor (Statoil), LLC | 6/18/2018 | 11/21/2018 | TBD | Two met buoys, one wave/met buoy, and one subsea Current Meter Mooring |
| OCS-A 0519 | Delaware | Skipjack Offshore Energy, LLC | 5/24/2019 | TBD | TBD | One met buoy |
| OCS-A 0520 | Massachusetts | Equinor Wind US, LLC | TBD | TBD | TBD | TBD |
| OCS-A 0521 | Massachusetts | Mayflower Wind | 7/29/2019 | 5/26/2020 | TBD | One met buoy |
| OCS-A 0522 | Massachusetts | Vineyard Wind, LLC | 3/6/2020 | TBD | TBD | Two met buoys |

met = meteorological; SAP = Site Assessment Plan; TBD = to be determined
[a] This is included in modifications to Research Activities Plan rather than SAP.

**Table E-4: Anticipated Construction Schedule in Number of Foundations (as of September 1, 2022)[a]**

| Project/Region | Before 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 and Beyond |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **State Waters** | | | | | | | | | | | |
| Maine Aqua Ventus (state waters) | | | | 2 [b] | | | | | | | |
| Block Island Wind Farm (state waters) | 5 [b] | | | | | | | | | | |
| **Massachusetts/Rhode Island Region** | | | | | | | | | | | |
| Vineyard Wind 1, part of OCS-A 0501 | | | 63 | | | | | | | | |
| South Fork Wind, part of OCS-A 0517 | | | | 16 | | | | | | | |
| Revolution Wind, part of OCS-A 0486 | | | | 102 | | | | | | | |
| New England Wind Phase 1 (Proposed Action), part of OCS-A 0534 | | | | 62 | | | | | | | |
| New England Wind Phase 2, part of OCS-A 0534 | | | | | 68 | | | | | | |
| Sunrise, parts of OCS-A 0500 and OCS-A 0487 | | | | 123 | | | | | | | |
| Mayflower (North), part of OCS-A 0521 | | | | | | 149 | | | | | |
| Beacon Wind | | | | | | 106 | | | | | |
| Bay State Wind | | | | | | 165 | | | | | |
| Liberty Wind | | | | | | 138 | | | | | |
| Future Project(s) in Massachusetts/Rhode Island Region | | | | | | 51 | | | | | |
| *Estimated Annual Massachusetts/Rhode Island Construction:* | *0* | *0* | *63* | *303* | *68* | *609* | *0* | *0* | *0* | *0* | *0* |
| *Estimated Operations Total:* | *0* | *0* | *0* | *0* | *202* | *304* | *472* | *540* | *689* | *1,043* | *1,043* |
| **New York/New Jersey Region** | | | | | | | | | | | |
| Ocean Wind, part of OCS-A 0498 | | | | 101 | | | | | | | |
| Empire Wind, part of OCS-A 0512 | | | | | 72 | | | | | | |
| Empire Wind Phase 2, part of OCS-A 0512 | | | | 104 | | | | | | | |
| Atlantic Shores 1, part of OCS-A 0499 | | | | | 110 | | | | | | |
| Atlantic Shores 2, part of OCS-A 0499 | | | | | | 100 | | | | | |
| Ocean Wind 2, part of OCS-A 0532 | | | | | | | 113 | | | | |
| Atlantic Shores North, part of OCS-A 0549 | | | | | | | 159 | | | | |
| OW Ocean Winds East OCS, part of OCS-A 0537 | | | | | | | 74 | | | | |
| Attentive Energy, part of OCS-A 0538 | | | | | | | | | | 82 | |
| Bight Wind Holdings, part of OCS-A 0539 | | | | | | | | | | 118 | |
| Atlantic Shores Offshore Wind Bight, part of OCS-A 0541 | | | | | | | | | | 79 | |
| Invenergy Wind Offshore, part of OCS-A 0542 | | | | | | | | | | 80 | |
| Mid-Atlantic Offshore Wind, part of OCS-A 0544 | | | | | | | | | | 45 | |
| Future Project(s) in New York/New Jersey Region | | | | | | | | | | | |
| *Estimated Annual New York/New Jersey Construction:* | *0* | *0* | *0* | *205* | *182* | *100* | *346* | *0* | *0* | *404* | *0* |
| *Estimated Operations Total:* | *0* | *0* | *0* | *0* | *101* | *173* | *173* | *273* | *273* | *386* | *790* |

| **Project/Region** | **Before 2020** | **2021** | **2022** | **2023** | **2024** | **2025** | **2026** | **2027** | **2028** | **2029** | **2030 and Beyond** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Delaware/Maryland Region** | | | | | | | | | | | |
| Skipjack, part of OCS-A 0519 | | | | | 17 | | | | | | |
| US Wind, part of OCS-A 0490 | | | | | 125 | | | | | | |
| Garden State Offshore Energy I, part of OCS-A 0482 | | | | | | 93 | | | | | |
| *Estimated Annual Delaware/Maryland Construction:* | *0* | *0* | *0* | *0* | *142* | *93* | *0* | *0* | *0* | *0* | *0* |
| *Estimated Operations Total:* | *0* | *0* | *0* | *0* | *0* | *0* | *17* | *17* | *142* | *235* | *235* |
| **Virginia/North Carolina Region** | | | | | | | | | | | |
| Coastal Virginia Offshore Wind, OCS-A 0497 | 2 | | | | | | | | | | |
| Coastal Virginia Offshore Wind, part of OCS-A 0483 | | | | 208 | | | | | | | |
| Kitty Hawk Wind, part of OCS-A 0508 | | | | | | | 70 | | | | |
| Total Energies, part of OCS-A 0545 | | | | | | 75 | | | | 80 | |
| Duke Energy, part of OCS-A 0546 | | | | | | | | | | 80 | |
| Kitty Hawk South, part of OCS-A 0508 | | | | | | | | 123 | | | |
| *Estimated Annual Virginia Construction:* | *2* | *0* | *0* | *208* | *0* | *75* | *70* | *123* | *0* | *160* | *0* |
| *Estimated Operations Total:* | *2* | *2* | *2* | *2* | *2* | *2* | *355* | *355* | *355* | *255* | *638* |
| **Estimated Annual Total Construction:** | **7** | **0** | **63** | **716** | **392** | **877** | **416** | **123** | **0** | **564** | **0** |
| **Estimated Operations Total:** | **7** | **9** | **9** | **11** | **314** | **488** | **956** | **1,124** | **1,398** | **1,958** | **2,522** |

OCS = Outer Continental Shelf

[a] Construction schedules for projects are assumed to occur over a 2-year period; for this planned activities analysis, it has been assumed that pile driving would occur during year 1 of construction and that all other construction activities would occur in year 2.

[b] Foundations are located in state waters.

In addition to the assumptions identified under Table E-1, future offshore wind projects would be subject to evolving economic, environmental, and regulatory conditions. Lease areas may be split into multiple projects, expanded, or removed, and development within a particular lease area may occur in phases over long periods of time. Research currently being conducted[3] in combination with data gathered regarding physical, biological, socioeconomic, and cultural resources during development of initial offshore wind projects in the United States could affect the design and implementation of future projects, as could advancements in technology. For these reasons, it is not possible to accurately predict the nature, location, and scale of potential impacts on resources across all lease areas. At the time of this EIS, 49 percent of the OCS Atlantic lease areas (15 locations out of the 28; 1,099,966 acres) have submitted a COP to BOEM for review and consideration. BOEM has made the following qualitative assumptions about possible future impacts of offshore wind development across all leased areas that have been considered in the planned activities analysis:

- BOEM assumes proposed offshore wind projects will include the same or similar components as the proposed Project: wind turbines with fixed foundations, inter-array cable system, offshore export cable corridor, one or more ESPs, and onshore interconnection facilities. BOEM further assumes that other potential offshore wind projects will employ the same or similar construction, operation, and decommissioning activities as the proposed Project. Economies of scale could be realized in terms of port development and regional transmission support, as the onshore transmission systems could improve to support power incoming from multiple offshore wind projects. For purposes of this analysis, however, and as described below, BOEM assumes that each project will have its own cable (both onshore and offshore) and that future projects would not use regional transmission support.
- Where possible, future projects could potentially seek to collocate onshore facilities and offshore cabling systems to avoid creation of new impact areas.
- Public attitudes toward offshore wind facilities may change over time as initial projects become operational, potentially affecting potential impacts on recreation, visual resources, and socioeconomic resources, and affecting how future projects are designed.
- Adaptive management could be used for many resources, particularly regulated fisheries and wildlife resources (including birds, benthic resources, finfish, invertebrates, essential fish habitat, marine mammals, and sea turtles), which would be closely monitored for potential impacts. If data collected are sufficiently robust, BOEM or other resource agencies could use the information obtained to support potential regulation changes or new mitigation and monitoring measures for future projects.
- Build-out of the U.S. offshore wind industry could displace non-renewable resources such as fossil fuel plants for power generation, resulting in a greater beneficial impact on air quality and potential reduction in regional and national greenhouse gas (GHG) emissions to address climate change.

For consideration of environmental impacts from future offshore wind projects, Table E-5 provides a list of best management practices that were considered in the impact analysis. The best management practices were adopted from the Record of Decision (MMS 2007a) for the 2007 *Final Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf* (MMS 2007b).

[3] In addition to private and state-funded research, BOEM-funded research continues to contribute to the growing body of scientific knowledge on the marine environment and informs BOEM's decision-making regarding renewable energy planning, leasing, and development efforts. Ongoing and completed studies are listed on BOEM's website at https://www.boem.gov/Renewable-Energy-Environmental-Studies/.

**Table E-5: Best Management Practices for Future Offshore Wind Activities**

| |
|---|
| ***Preconstruction Planning*** |
| Lessees and grantees shall minimize the area disturbed by preconstruction site monitoring and testing activities and installations. |
| Lessees and grantees shall contact and consult with the appropriate affected federal, state, and local agencies early in the planning process. |
| Lessees and grantees shall consolidate necessary infrastructure requirements between projects whenever practicable. |
| Lessees and grantees shall develop a monitoring program to ensure that environmental conditions are monitored during construction, operation, and decommissioning phases. The monitoring program requirements, including adaptive management strategies, shall be established at the project level to ensure that potential adverse impacts are mitigated. |
| ***Seafloor Habitats*** |
| Lessees and grantees shall conduct seafloor surveys in the early phases of a project to ensure that the alternative energy project is sited appropriately to avoid or minimize potential impacts associated with seafloor instability or other hazards. |
| Lessees and grantees shall conduct appropriate pre-siting surveys to identify and characterize potentially sensitive seafloor habitats and topographic features. |
| Lessees and grantees shall avoid locating facilities near known sensitive seafloor habitats, such as coral reefs, hard-bottom areas, and chemosynthetic communities. |
| Lessees and grantees shall avoid anchoring on sensitive seafloor habitats. |
| Lessees and grantees shall minimize seafloor disturbance during construction and installation of the facility and associated infrastructure. |
| Lessees and grantees shall employ appropriate shielding for underwater cables to control the intensity of electromagnetic fields. |
| Lessees and grantees shall reduce scouring action by ocean currents around foundations and to seafloor topography by taking all reasonable measures and employing periodic routine inspections to ensure structural integrity. |
| Lessees and grantees shall take all reasonable actions to minimize seabed disturbance and sediment dispersion during cable installation. |
| ***Marine Mammals*** |
| Lessees and grantees shall evaluate marine mammal use of the proposed project area and design the project to minimize and mitigate the potential for mortality or disturbance. The amount and extent of ecological baseline data required will be determined on a project basis. |
| Vessels related to project planning, construction, and operation shall travel at reduced speeds when assemblages of cetaceans are observed and maintain a reasonable distance from whales, small cetaceans, and sea turtles as determined during site-specific consultations. |
| Lessees and grantees shall minimize potential vessel impacts on marine mammals and sea turtles by requiring project-related vessels to follow the NMFS and BOEM requirements while in transit. Operators shall be required to undergo training on applicable vessel requirements. |
| Lessees and grantees shall take efforts to minimize disruption and disturbance to marine life from sound emissions, such as pile driving, during construction activities. |
| Lessees and grantees shall avoid and minimize impacts on marine species and habitat in the project area by posting a qualified observer approved by BOEM and NMFS on-site during construction activities. |
| ***Fish Resources and Essential Fish Habitat*** |
| Lessees and grantees shall conduct pre-siting surveys (may use existing data) to identify important, sensitive, and unique marine habitats in the vicinity of the project and design the project to avoid, minimize, or otherwise mitigate adverse impacts on these habitats. |
| Lessees and grantees shall minimize construction activities in areas containing anadromous fish during migration periods. |
| Lessees and grantees shall minimize seafloor disturbance during construction and installation of the facility and associated infrastructure. |
| ***Sea Turtles*** |
| Lessees and grantees shall minimize potential vessel impacts on marine mammals and sea turtles by requiring project-related vessels to follow the NMFS Regional Viewing Guidelines while in transit. Operators shall be required to undergo training on applicable vessel guidelines. |
| Lessees and grantees shall take efforts to minimize disruption and disturbance to marine life from sound emissions, such as pile driving, during construction activities. |
| Lessees and grantees shall locate cable landfalls and onshore facilities so as to avoid impacts on known nesting beaches. |
| ***Avian Resources*** |
| Lessees shall evaluate avian use of the project area and design the project to minimize or mitigate the potential for bird strikes and habitat loss. The amount and extent of ecological baseline data required will be determined on a project-by-project basis. |
| Lessees and grantees shall take measures to reduce perching opportunities. |
| Lessees and grantees shall locate cable landfalls and onshore facilities so as to avoid impacts on known nesting beaches. |
| Lessees and grantees shall comply with FAA and USCG requirements for lighting while using lighting technology (e.g., low-intensity strobe lights) that minimizes impacts on avian species. |

| |
|---|
| ***Acoustic Environment*** |
| Lessees and grantees should plan site characterization surveys by using the lowest sound levels necessary to obtain the information needed. |
| Lessees and grantees shall take efforts to minimize disruption and disturbance to marine life from sound emissions such as pile driving during construction activities. |
| Lessees and grantees shall employ, to the extent practicable, state-of-the- art, low-noise turbines or other technologies to minimize operational sound impacts. |
| ***Fisheries*** |
| Lessees and grantees shall work cooperatively with commercial/recreational fishing entities and interests to ensure that the construction and operation of a project will minimize potential conflicts with commercial and recreational fishing interests. |
| Lessees and grantees shall review planned activities with potentially affected fishing organizations and port authorities to prevent unreasonable fishing gear conflicts. Lessees and grantees shall minimize conflict with commercial fishing activity and gear by notifying registered fishermen of the location and time frame of project construction activities well in advance of mobilization with updates throughout the construction period. |
| Lessees and grantees shall use practices and operating procedures that reduce the likelihood of vessel accidents and fuel spills. |
| Lessees and grantees shall avoid or minimize impacts on the commercial fishing industry by marking applicable structures (e.g., wind turbines, wave generation structures) with USCG approved measures (such as lighting) to ensure safe vessel operation. |
| Lessees and grantees shall avoid or minimize impacts on the commercial fishing industry by burying cables, where practicable, to avoid conflict with fishing vessels and gear operation. If cables are buried, lessees and grantees shall inspect cable burial depth periodically during project operation to ensure that adequate coverage is maintained to avoid interference with fishing gear/activity. |
| ***Coastal Habitats*** |
| Lessees and grantees shall avoid hard-bottom habitats, including seagrass communities and kelp beds, where practicable, and restore any damage to these communities. |
| Lessees and grantees shall implement turbidity reduction measures to minimize impacts on hard-bottom habitats, including seagrass communities and kelp beds, from construction activities. |
| Lessees and grantees shall minimize impacts on seagrass and kelp beds by restricting vessel traffic to established traffic routes. |
| Lessees and grantees shall minimize impacts on wetlands by maintaining buffers around wetlands, implementing best management practices for erosion and sediment control, and maintaining natural surface drainage patterns. |
| ***Electromagnetic Fields*** |
| Lessees and grantees shall use submarine cables that have proper electrical shielding and bury the cables in the seafloor where practicable. |
| ***Transportation and Vessel Traffic*** |
| Lessees and grantees shall site alternative energy facilities to avoid unreasonable interference with major ports and USCG-designated Traffic Separation Schemes. |
| Lessees and grantees shall meet FAA guidelines for siting and lighting of facilities. |
| Lessees and grantees shall place proper lighting and signage on applicable alternative energy structures to aid navigation per USCG circular NVIC 01-19 (USCG 2020) and comply with any other applicable USCG requirements. |
| Lessees and grantees shall conduct all necessary studies of potential interference of proposed WTGs with commercial air traffic control radar systems, national defense radar systems, and weather radar systems, including identification of possible solutions. |
| ***Visual Resources*** |
| Lessees and grantees for wind projects shall address key design elements including visual uniformity, use of tubular towers, and proportion and color of turbines. |
| Lessees and grantees for wind projects shall use appropriate viewshed mapping, photographic and virtual simulations, computer simulation, and field inventory techniques to determine with reasonable accuracy the visibility of the proposed project. Simulations should illustrate sensitive and scenic viewpoints. |
| Lessees and grantees shall comply with FAA and USCG requirements for lighting while minimizing the impacts through appropriate application. |
| Lessees and grantees shall seek public input in evaluating the visual site design elements of proposed wind energy facilities. |
| Lessees and grantees, within FAA guidelines, shall use directional aviation lights that minimize visibility from shore. |
| ***Cultural Resources*** |
| Lessees and grantees shall conduct magnetometer tows using 100-foot (30-meter) line spacing in areas where there is a high potential for shipwrecks. |

Source: Adopted from MMS 2007b

BOEM = Bureau of Ocean Energy Management; FAA = Federal Aviation Administration; NMFS = National Marine Fisheries Service; USCG = U.S. Coast Guard; WTG = wind turbine generator

### E.3.5 Port Upgrades

Ports in Connecticut, Rhode Island, Massachusetts, New York, and New Jersey may require upgrades to support the offshore wind industry.[4] Upgrades may include onshore developments or underwater improvements (such as dredging). The following summarizes reasonably foreseeable activities at regional ports that are planned to support the proposed Project and other past, present, and reasonably foreseeable offshore wind project activities at ports near the RI/MA Lease Areas:

- The Connecticut Port Authority 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 2018), 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 Ørsted 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). In 2013 the Port of Davisville added a 150-megaton mobile harbor crane, which will enable the port to handle wind turbines and heavy equipment and participate in regional offshore wind projects (Quonset Development Corporation 2016). 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 offshore wind transmission cables manufacturing, turbine component manufacturing and assembly, substation manufacturing and assembly, operations and maintenance bases, and turbine component storage. The 18 sites include two identified by Vineyard Wind, LLC, as potential construction or operations and maintenance ports: the Brayton Point Power Plant site and the Montaup Power Plant site.
  - The former Brayton Point Power Plant is currently being redeveloped as the Brayton Point Commerce Center, a "world-class logistical port and support center built for offshore wind…capable of component manufacturing, staging, operations, and maintenance for offshore wind and other related sectors" (Brayton Point Commerce Center 2022). The site redevelopment includes the proposed Anbaric Renewable Energy Center, which will include development of a 1,200 megawatts (MW) high-voltage direct current converter and 400 MW of battery storage on the site (Anbaric 2019a). Development of the Brayton Point Commerce Center and the Anbaric Renewable Energy Center is considered reasonably foreseeable, as the projects are currently active.

[4] BOEM 2016 includes an assessment of port capacity, potential environmental and socioeconomic consequences of port modifications to support offshore wind development, and the effectiveness of potential mitigation measures to reduce the consequences of port modifications.

  - The Montaup Power Plant site is a former power plant site located in Somerset, Massachusetts, that was also identified by the MassCEC as having potential to support construction of turbine components, as well as operations and maintenance activities (MassCEC 2017a). No plan for redevelopment of the Montaup Power Plant has been released (MassCEC 2017a); therefore, improvements at this site are not considered reasonably foreseeable.

- The MassCEC manages the New Bedford Marine Commerce Terminal (MCT) 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 2022). The *New Bedford Port Authority Strategic Plan 2018–2023* contains goals related to expanding the MCT 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 MCT in October 2018 (Port of New Bedford Undated) 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).
- 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).
- Vineyard Wind would use Vineyard Haven Harbor in Tisbury as the location of the Vineyard Wind 1 Project's Operations and Maintenance Facility. Vineyard Haven Harbor is the island's year-round working port and is home to most of the Martha's Vineyard boatyards. Small coastal tankers and ferries regularly use Vineyard Haven Harbor to transport freight, vehicles, and passengers. The areas of Tisbury near the Vineyard Haven Harbor are a mix of marine-related, commercial, and residential uses.

Potential impacts related to port upgrades could include, but are not limited to, the following:

- Increased seafloor disturbance, turbidity, and benthic habitat alterations;
- Risk of direct physical impacts, displacement, or disturbance to wildlife, including threatened/endangered species;
- Increased vessel traffic and associated effluent discharges, air emissions, and noise;
- Visual impacts on onshore and offshore observers within the daytime and nighttime visibility zones;
- Economic impacts, including beneficial impacts on tax revenues, employment, and economic activity associated with operating the wind energy facility, maintaining the wind energy facility, tourism, and other ocean economy sectors;
- Displacement or reduction in fishing opportunities (commercial and recreational), marine mineral extraction, and other ocean economy sectors;
- Displacement of recreational opportunities or change in value of recreational opportunities;
- Disturbance of cultural resources or impacts on cultural values; and
- Introduction of navigational obstructions to aviation and marine vessels (submarine and surface vessels).

### E.3.6 Offshore Transmission Cables Construction and Maintenance

The following summarizes reasonably foreseeable activities for offshore transmission cables, not associated with any specific wind projects, that are planned near the RI/MA Lease Areas:

- Anbaric Development Partners, LLC, has submitted unsolicited proposals to BOEM for development of two open-access offshore transmission systems designed to support offshore wind in the northeastern United States; however, neither is considered a reasonably foreseeable project for this analysis.
- The proposed New York/New Jersey Ocean Grid Project would consist of approximately 185 nautical miles (213 miles) of subsea transmission cables and up to nine offshore collector platforms. The transmission network would collect and distribute power from wind lease areas offshore New York and New Jersey to up to six onshore landing locations from Long Island to Cardiff, New Jersey (Anbaric 2018).
- The proposed Southern New England OceanGrid Project would consist of 337 nautical miles (388 miles) of subsea transmission cables and up to eight offshore collector platforms around the RI/MA Lease Areas. The transmission network would collect and distribute power generated from RI/MA Lease Areas to landings between Long Island Sound and Massachusetts (Anbaric 2019b).

The transmission systems would be “open access” and allow multiple offshore wind farms to connect to a single transmission line, potentially consolidating cabling systems, landing areas, and onshore infrastructure. Using a transmission network may reduce total miles of cables required to connect offshore wind farms, environmental impacts associated with subsea cabling and onshore interconnections, and costs of development and operation. BOEM issued a Request for Competitive Interest for the New York/New Jersey Ocean Grid Project in June 2019 (84 Fed. Reg. 118 pp. 28582–28587). These projects are currently under review with BOEM and are not considered reasonably foreseeable due to the current lack of concrete development plans. Even if BOEM did consider these projects reasonably foreseeable, they would not be considered in the maximum-case scenario because implementation of these networks would serve to reduce impacts associated with the transmission system. The maximum-case scenario for offshore cables associated with offshore wind development is defined as each lease having separate offshore cables, landing sites, and onshore interconnection facilities.

Reasonably foreseeable impacts of new transmission system projects associated with individual offshore wind projects could include (BOEM 2016):

- Increased vessel traffic and associated effluent discharges, air emissions, and noise during construction and decommissioning;
- Increases of accidental releases of trash and marine debris during construction and decommissioning;
- Intermittent underwater noise associated with construction, including noise from ESP construction activities;
- Temporary disturbance of benthic habitat from installation and long-term impacts from habitat conversion;
- Increased potential for oil spills during construction and decommissioning;
- Potential interaction with existing telecommunication cables; and
- Temporary sediment disturbance during installation or maintenance.

### E.3.7 Mitigation and Monitoring

Future offshore wind projects could require monitoring or mitigation as part of BOEM approvals under the National Environmental Policy Act (U.S. Code, Title 42, Section 4321 et seq. [42 USC § 4321 et seq.]) and Outer Continental Shelf Lands Act (43 USC § 1337(p)(1)(c)). Although specific measures are too speculative to include at this time, measures could include actions such as passive acoustic monitoring, trawl surveys, acoustic telemetry, and gillnet or ventless trap surveys.

## E.4 Incorporation by Reference of Cumulative Impacts Study

BOEM has completed a study of IPFs on the 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 on the North Atlantic OCS that were incorporated into this EIS analysis. If an IPF was not associated with the proposed 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. The following subsections list reasonably foreseeable non-offshore wind activities that may contribute to the cumulative impacts of the proposed Project.

## E.5 Other Activities

### E.5.1 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 proposed Project:

- New Shoreham (Block Island), Rhode Island, is served by a submarine power cable from the Block Island Wind Farm.
- A submarine power cable connects Block Island to the mainland electrical grid at Narragansett, Rhode Island.
- Electric service to Martha’s Vineyard is provided by four cables from Falmouth, located in three corridors through Vineyard Sound. Two cables are collocated in a corridor between Elm Road in Falmouth and West Chop; one is located between Shore Street in Falmouth and Eastville (East Chop), and one connects Mill Road in Falmouth to West Chop.
- Two electric cables service Nantucket through Nantucket Sound, from Dennis Port and Hyannis Port to landfall at Jetties Beach.

- Additional submarine cables are located offshore New England and mid-Atlantic states, but outside the SWDA. These include fiber-optic cables and trans-Atlantic cables that originate near Charlestown, Rhode Island; New York City; Long Island; and Wall, New Jersey.
- Two natural gas pipelines are located offshore Boston, Massachusetts, in Massachusetts Bay and lead to the Neptune pipeline and the Northeast Gateway liquified natural gas (LNG) export facilities.

### E.5.2 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 (MRECo 2017a, 2017b);
- The Western Passage Tidal Energy Project, a proposed tidal energy site in the Western Passage, received a preliminary permit from the Federal Energy Regulatory Commission (FERC) in 2016. The preliminary permit allows developers to study a project but does not authorize construction (Tethys Undated); and
- The Roosevelt Island Tidal Energy (RITE) Project is 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 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 2012). Tidal testing for the RITE Project is underway (USDOE 2021).

### E.5.3 Dredging and Port Improvement Projects

The following dredging projects have been proposed or studied between New York City and Boston, and are either in operation or are considered reasonably foreseeable:

- The U.S. Army Corps of Engineers (USACE) New England District, in partnership with Rhode Island Coastal Resources Management Council has proposed a project to 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 Rhode Island Coastal Resources Management Council has awarded funding for seven habitat restoration projects, including a dune habitat restoration project, a salt marsh adaptation project, a coastal habitats restoration project, an in-water and bank habitat improvement project, and three projects involving restoration of fish passage (RI CRMC 2021).
- The Town of Dennis is conducting selective annual dredging of multiple navigation and mooring basins within multiple waterways in the towns of Dennis and Yarmouth. Suitable dredged material would be used as nourishment on multiple town-owned beaches in Dennis, while material deemed unsuitable for beach nourishment would be disposed of at the Cape Cod Bay Disposal Site and at the South Dennis Landfill. The town would dredge approximately 434,310 cubic yards from approximately 96.03 acres of these waterways over 10 years (USACE 2018d; capecod.gov 2022).
- The State of New Jersey is planning to build an offshore wind port on the eastern shore of the Delaware River in Lower Alloways Creek, Salem County, approximately 7.5 miles southwest of the city of Salem. The New Jersey Economic Development Authority is leading the development of the project on behalf of multiple state agencies. The development plan includes dredging the Delaware River Channel, with a targeted completion date of late 2023 (New Jersey Wind Port Undated).
- The USACE has proposed maintenance dredging of portions of the Newark Bay, New Jersey Federal Navigation Channel, including the removal of material from the Main and Port Newark Channels. Maintenance dredging and associated upland placement activities are planned to occur between June 2022 and January 2022 (USACE 2021).

The following port improvement projects have been proposed in Massachusetts, Rhode Island, Connecticut, and/or New Jersey, and are either in operation or are considered reasonably foreseeable:

- The Connecticut Port Authority 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 2018), 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. Redevelopment of the Connecticut State Pier partially to support the offshore wind industry is intended to increase regional job growth. The development partnership includes a 3-year plan to upgrade infrastructure to meet heavy-lift requirements of Ørsted and Eversource offshore wind components (Cooper 2019).

### E.5.4 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 Maryland near Fenwick Island, Delaware, and Ocean City, Maryland (Lease Number OCS-A 0536) (NOAA 2022).

Reconnaissance and/or design-level OCS studies along the East Coast from Rhode Island to Florida have identified potential future sand resources. The closest sand resources to the proposed Project include locations offshore Rhode Island (between Block Island and Charlestown), the southern shore of Long Island (Rockaway Beach, Long Beach, and Fire Island, New York), and Sandy Hook, New Jersey.

U.S. Environmental Protection Agency Region 1 is responsible for designating and managing ocean disposal sites for dredged materials offshore in the region of the proposed Project. The USACE issues permits for ocean disposal sites pursuant to Marine Protection, Research, and Sanctuaries Act (16 USC § 1431 et seq. and 33 USC § 1401 et seq.). There are ten active dredge disposal projects along the Massachusetts, Rhode Island, Connecticut, and New York coasts. The closest to the proposed Project is the Rhode Island Sound Disposal Site northeast of Block Island (NOAA 2022).

### E.5.5 Military Use

Military activities can include various vessel training exercises, submarine and antisubmarine training, and aircraft exercises. The U.S. Navy, 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 the USCG Academy (COP Volume III, Section 7.9.1; Epsilon 2022). 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 (COP Volume III, Section 7.9.1; Epsilon 2022).

### E.5.6 Marine Transportation

Marine transportation in the region is diverse and uses many ports and private harbors from New Jersey 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. Multiple federal agencies, state agencies, educational institutions, and environmental non-governmental organizations participate in ongoing research offshore including oceanographic, biological, geophysical, and archaeological surveys. Most vessel traffic, excluding recreational vessels, tends to travel within established vessel traffic routes and the number of trips, as well as the number of unique vessels, has remained consistent (USCG 2021). In response to future offshore wind projects in the New York Bight, multiple additional fairways and a new anchorage may be established to route existing vessel traffic around wind energy projects (USCG 2021). One new regional maritime highway project received funding from the Maritime Administration: a new barge service (Davisville/Brooklyn/ Newark Container-on-Barge 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 (MARAD 2021), which is located on Quonset Point, one of the potential operations and maintenance locations.

### E.5.7 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 Endangered Species Act (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 SWDA. 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 New England south into the mid-Atlantic region. Surveys include:

- The NEFSC Bottom Trawl Survey, a more than 50-year multispecies stock assessment tool using a bottom trawl;
- The NEFSC Sea Scallop/Integrated Habitat Survey, a sea scallop stock assessment and habitat characterization tool, using a bottom dredge and camera tow;
- The NEFSC Surf clam/Ocean Quahog Survey, a stock assessment tool for both species using a bottom dredge; and
- 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.

### E.5.7.1 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 SWDA, 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 (*Eubalaena glacialis*), and research on population dynamics of harbor (*Phoca vitulina*) and gray seals (*Halichoerus grypus*). 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).

### E.5.7.2 Fisheries Use and Management

NMFS implements regulations to manage commercial and recreational fisheries in federal waters, including those where the proposed Project would be located. The states of New York, Rhode Island, and New Jersey and Commonwealth of Massachusetts regulate commercial fisheries in state-regulated waters (within 3 nautical miles [3.5 miles] of the coastline). Existing aquaculture operations lie near the southern portion of Horseshoe Shoals, near the main channel of Nantucket Sound (NOAA 2022). The proposed Project is not anticipated to impact leased aquaculture sites.

The proposed Project overlaps two of NMFS' eight regional councils to manage federal fisheries: the Mid-Atlantic Fishery Management Council, which includes New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina, and the New England Fishery Management Council, which includes Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut (NEFMC 2016). The councils manage species with fishery management plans that are frequently updated, revised, and amended and coordinate with each other to jointly manage species across jurisdictional boundaries (MAFMC Undated). The councils work with the Atlantic States Marine Fisheries Commission (ASMFC) on regional issues. 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 American lobster (*Homarus americanus*) and Jonah crab (*Cancer borealis*) fisheries are cooperatively managed by the states and NMFS under the framework of the ASMFC (2022).

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. NMFS also manages highly migratory species, such as tuna and sharks, that can travel long distances and cross domestic boundaries.

### E.5.8 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* (MMS 2007b) 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 for Atlantic OCS offshore wind development 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 found that the risks associated with an increase of global warming of 1.5 degrees Celsius (°C) or 2°C 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 on terrestrial ecosystems; impacts on marine biodiversity, fisheries, and ecosystems and their functions and services to humans; and impacts on health, livelihoods, food security, water supply, and economic growth (IPCC 2018). Table E-6 summarizes regional plans and policies in place to address climate change, and Table E-7 summarizes resiliency plans.

**Table E-6: Climate Change Plans and Policies**

| Plans and Policies | Summary/Goal |
|---|---|
| **New York** | |
| Reforming the Energy Vision (State of New York 2014) | State's energy policy to build integrated energy network; clean energy goal to reduce GHGs 40% by 2030 and 80% by 2050. |
| Order Adopting a Clean Energy Standard (State of New York Public Service Commission 2022) | 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 (NYSERDA 2015, 2017a) | Requires 40% reduction in GHGs from 1990 levels; 50% electricity will come from renewable energy resources; 600 trillion British thermal units increase in statewide energy efficiency. |
| Governor Cuomo State of State Address 2017, 2018, 2021 | 2017: Set offshore wind energy development goal of 2,400 MW by 2030 (New York Governor's Office 2017).<br>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 (New York Office of the Attorney General 2018; New York Governor's Office 2018).<br>2021: Establishes a goal of building out its renewable energy program (New York Governor's Office 2021). |
| New York State Offshore Wind Master Plan (2017) (NYSERDA 2017b) | Grants NYSERDA ability to award 25-year-long 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 required to submit at least one proposal of approximately 400 MW. |
| The Climate Leadership and Community Protection Act, enacted on July 18, 2019, signed into law in July 2019 and effective January 1, 2020 | Establishes economy-wide targets to reduce GHG emissions by 40% of 1990 levels by 2030 and 85% of 1990 levels by 2050. |
| **Massachusetts** | |
| Global Warming Solutions Act of 2008 | Framework to reduce GHG emissions by requiring 25% reduction in emissions from all sectors below 1990 baseline emission level in 2020 and at least 80% reduction in 2050. Full implementation is projected to result in total net reduction of 25.0 million metric tons of carbon dioxide equivalent, or 26.4% below 1990 baseline level (Commonwealth of Massachusetts 2018a). |
| Massachusetts CECP for 2020; 2015 CECP Update | Policies that aim to reduce GHG emissions across all sectors; full implementation 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). |

| Plans and Policies | Summary/Goal |
|---|---|
| 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 (Commonwealth of Massachusetts 2018a, 2018b). |
| Massachusetts CECP for 2030 | The 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 (Massachusetts Executive Office of Energy and Environmental Affairs 2022) 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 2020c). |
| 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 2020a). |
| 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 carbon dioxide 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% below the 1990 level (Commonwealth of Massachusetts 2020b). |
| **Rhode Island** | |
| 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). |
| Resilient Rhode Island Act (2014) (Rhode Island General Laws, § 42-6.2) | Established the Executive Climate Change Coordinating Council and set specific GHG reduction targets; incorporates consideration of climate change impacts into the powers and duties of all state agencies. |
| 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). |
| 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 2035 (State of Rhode Island 2015b). |
| 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 on the Rhode Island Office of Energy Resources to conduct economic and energy market analyses to develop an actionable plan to reach 100% renewable electricity by 2030 (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 Rhode Island Office of Energy Resources developed specific policy, programmatic, planning, and equity-based actions that will support achieving the 100% renewable electricity goal (State of Rhode Island 2020b). |
| 2021 Act on Climate (Rhode Island General Laws § 42-6.2-2) | This legislation updates Rhode Island's climate-emission reduction goals laid out in the 2014 Resilient Rhode Island Act and address areas such as environmental injustices, public health inequities, and a fair employment transition as fossil fuel jobs are |

| Plans and Policies | Summary/Goal |
|---|---|
| | 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. |
| **Connecticut** | |
| 2008 Global Warming Solutions Act (Public Act 08-98) | Sets forth statutory requirements to reduce GHG emissions 10% below 1990 levels by 2020 and 80% below 2001 levels by 2050. |
| 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 CES and IRP. |
| Comprehensive Energy Strategy (2018) | Connecticut DEEP update to CES to advance the state's goal of creating a cheaper, cleaner, more reliable energy future for residents and businesses. The CES analyzes energy use and key trends of the region (State of Connecticut 2018b). |
| Executive Order No. 3 (2019) | Re-establishes and expands the membership and responsibilities of the 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). |
| Integrated Resources Plan (2020) | DEEP is required to prepare an 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% zero carbon electric supply by 2040 in this IRP (State of Connecticut 2021a). |
| 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 2021b). |
| **New Jersey** | |
| New Jersey Energy Master Plan (State of New Jersey 2019a) | Updated in 2019, the plan sets the framework to implement Executive Order 28 by decarbonizing and modernizing New Jersey's energy system, expanding the clean energy innovation economy, and accelerating the deployment of renewable energy resources to meet the offshore wind energy generation goal established in Executive Order 92. |
| Executive Order 28: Measures to Advance New Jersey's Clean Energy Economy (2018) | Sets target of total conversion of the state's energy production profile to 100% clean energy sources on or before January 1, 2050. |
| Executive Order 92: Increase Offshore Wind Goal to 7,500 Megawatts by 2036 (2019b) | Establishes a goal of 3,500 MW of offshore wind energy generation by 2030. |
| Executive Order 100: Protecting Against Climate Threats; Land Use Regulations and Permitting (State of New Jersey 2020b) | Establishes a GHG monitoring and reporting program, establishes criteria to govern and reduce emissions, and integrates climate change considerations, such as sea level rise, into regulatory and permitting programs. |

CECP = Clean Energy and Climate Plan; CES = Comprehensive Energy Strategy; DEEP = Department of Energy and Environmental Protection; GC3 = Governor's Council on Climate Change; GHG = greenhouse gas; IRP = Integrated Resource Plan; MW = megawatt; NYSERDA = New York State Energy Research and Development Authority

**Table E-7: Resiliency Plans and Policies**

| Plans and Policies | Summary |
|---|---|
| **New York** | |
| Part 490 of Community Risk and Resiliency Act of 2014 (Title 6, New York Codes, Rules, and Regulations, Part 490) | Establishes statewide science-based sea level rise projections for coastal regions of the state. As of 2019, New York State Department of Environmental Conservation is in the process of developing a State Flood Risk Management Guidance document for state agencies. |
| NY Rising Community Reconstruction (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 (New York Governor's Office of Storm Recovery 2018). |
| Water Infrastructure Improvement Act, Water Quality Improvement Project Program, and Intermunicipal Grant | $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 (New York Governor's Office 2021). |
| **Massachusetts** | |
| Municipal Vulnerability Preparedness grant program (2022) | Provides support for cities and towns to plan for resiliency and implement key climate change adaptation actions for resiliency. The City of New Bedford received a Municipal Vulnerability Preparedness designation as of November 1, 2018 (Commonwealth of Massachusetts 2022b). |
| 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 2022a). |
| General Appropriations Bill, Fiscal Year 2022 (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). |
| Nantucket's Coastal Resilience Plan | The plan outlines Nantucket's approaches to preparing for and responding to sea level rise, coastal flooding, and coastal erosion. Key management activities include infrastructure improvement, revised zoning and other regulations, and budgetary measures to help the community address these concerns (Town and County of Nantucket 2021). |
| **Rhode Island** | |
| Shoreline Change Special Area Management Plan | The Rhode Island Coastal Resources Management Council is developing the Shoreline Change Special Area Management Plan to improve the state's resilience and manage the shoreline (RI CRMC 2018). |
| Act Authorizing Municipal Climate Change and Coastal Resiliency Reserve Funds (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** | |
| Resilient Connecticut | Connecticut Institute for Resilience & Climate Adaptation was awarded an $8 million from the National Disaster Relief Competition to develop the Resilient Connecticut project. Coordination of the institute, 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 (CIRCA 2021). |

| Plans and Policies | Summary |
|---|---|
| An Act Concerning Climate Change Adaptation (Public Act 21-115) | Act approved July 6, 2021. Addresses the rising seas, frequent flooding, heat waves, and drought expected between now and 2050. 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. |
| **New Jersey** | |
| New Jersey Draft Climate Change Resilience Strategy | This is New Jersey's first statewide climate resiliency strategy and was released as a draft in April 2021. Develops a framework for policy, regulatory, and operational changes to support the resilience of New Jersey's communities, economy, and infrastructure. Includes 125 recommended actions across the following six priority areas: build resilient and healthy communities, strengthen the resilience of New Jersey's ecosystems, promote coordinated governance, invest in information, increase public understanding, promote climate-informed investments and innovative financing, and coastal resilience plan (State of New Jersey 2021). |

### E.5.9 Oil and Gas Activities

The proposed Project is located in the North Atlantic Planning Area of the OCS Oil and Gas Leasing 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 from July 1, 2022, through June 30, 2032. 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 (1) obtain data for hydrocarbon exploration and production; (2) locate and monitor marine mineral resources; (3) aid in locating sites for alternative energy structures and pipelines; (4) identify possible human-made, seafloor, or geological hazards; and (5) locate potential archaeological and benthic resources. G&G surveys are typically classified into the following categories by equipment and survey type:

- Deep-penetration seismic airgun surveys (two-, three-, and four-dimensional, ocean-bottom nodal, and azimuth multi-vessel surveys);
- Airgun high-resolution geophysical 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 high-resolution geophysical 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; and
- 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 the *Gulf of Mexico OCS Proposed Geological and Geophysical Activities: Western, Central, and Eastern Planning Areas* Final Programmatic EIS (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 Undated). Table E-8 lists the eight existing or approved 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, storage of LNG for periods of peak demand, or production of LNG for fuel and industrial use (FERC 2022).

**Table E-8: Liquid Natural Gas Terminals Located in the Eastern United States**

| Terminal Name | Type | Company | Jurisdiction | Approximate Location Relative to Proposed Project | Status |
|---|---|---|---|---|---|
| Everett, Massachusetts | Import terminal | GDF SUEZ—DOMAC | FERC | 90 miles north | Existing |
| Offshore Boston, Massachusetts | Import terminal | GDF SUEZ—Neptune LNG | MARAD/USCG | 100 miles north | Existing |
| Offshore Boston, Massachusetts | Import terminal, authorized to re-export delivered LNG | Excelerate Energy—Northeast Gateway | MARAD/USCG | 95 miles north | Existing |
| Cove Point, Maryland (Chesapeake Bay) | Import terminal | Dominion—Cove Point LNG | FERC | 340 miles southwest | Existing |
| Cove Point, Maryland (Chesapeake Bay) | Export terminal | Dominion—Cove Point LNG | FERC | 340 miles southwest | Existing |
| Elba Island, Georgia (Savannah River) | Import terminal | El Paso—Southern LNG | FERC | 835 miles southwest | Existing |
| Elba Island, Georgia (Savannah River) | Export terminal | Southern LNG Company | FERC | 835 miles southwest | Existing |
| Jacksonville, Florida | Export terminal | Eagle LNG Partners | FERC | 960 miles southwest | Approved |

Source: Adopted from FERC 2022

FERC = Federal Energy Regulatory Commission; LNG = liquified natural gas; MA = Massachusetts; MARAD = U.S. Department of Transportation Maritime Administration; USCG = U.S. Coast Guard

### E.5.10 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-9).

**Table E-9: Existing, Approved, and Proposed Onshore Development Activities**

| Type | Description |
|---|---|
| Local planning documents | • Suffolk County Master Plan (Suffolk County 2015)<br>• A City Master Plan: New Bedford 2020 (Vanasse Hangen Brustlin, Inc 2010)<br>• Town of North Kingstown Comprehensive Plan Update 2008 (Town of North Kingstown 2008)<br>• Washington County Transfer of Development Rights Study (Horsely Witten Group 2012)<br>• North Kingstown Comprehensive Plan Re-Write 2019 (Interface Studio 2019) |
| Onshore wind projects | There are 14 onshore wind projects located within the 46-mile viewshed of the project (Hoen et al. 2018). |
| Communications towers | There are numerous communications towers in communities within the viewshed of the proposed Project components, including 134 communication towers within a 3-mile radius of Nantucket, 327 communication towers within a 3-mile radius of Barnstable, and 89 communication towers within a 3-mile radius of Bridgeport (AntennaSearch.com 2022). |
| Development projects | The Fire Island Inlet to Montauk Point project is a $1.2 billion project by the USACE, New York Department of Environmental Concern, and Long Island, New York, 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 (USACE 2022).<br>In 2019, National Grid completed and began operating a diesel generator and a battery electric storage system at an existing electric generating facility approximately 1 mile north of Nantucket's southern coastline (Renewable Energy World 2019; Walton 2018). |
| Port studies/upgrades | The State of New Jersey plans to build an offshore wind port on the eastern shore of the Delaware River in Lower Alloways Creek, Salem County, approximately 7.5 miles southwest of the city of Salem. The port site is adjacent to Public Service Enterprise Group's Hope Creek Nuclear Generating Station. Construction is planned to be completed in late 2023. The development plan includes construction of a heavy-lift wharf with a dedicated delivery berth and an installation berth that can accommodate jack-up vessels, a 30-acre marshaling area for component assembly and staging, a dedicated overland heavy-haul transportation corridor, and potential for additional laydown areas (New Jersey Wind Port Undated). Both the Atlantic Shores South and Ocean Wind 2 projects have committed to building a nacelle assembly facility at the New Jersey Wind Port. Atlantic Shores plans to partner with MHI Vestas for this facility, while Ocean Wind will collaborate with General Electric (NJ BPU 2021).<br>In 2020, the State of New Jersey announced a $250 million investment in a manufacturing facility to build steel components for offshore wind turbines at the Port of Paulsboro on the Delaware River in New Jersey (State of New Jersey State 2020a). Construction on the facility began in January 2021, with production anticipated to begin in 2023 (Pytell 2020). Both the Atlantic Shores South and Ocean Wind 2 projects will use the foundation manufacturing facility at the Port of Paulsboro (NJ BPU 2021).<br>The USACE completed the Lake Montauk Harbor Feasibility Study in 2020 (USACE and NYSDEC 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.<br>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 [offshore wind] projects" (Table 26; NYSERDA 2017b). Nearly all identified sites would require some level of infrastructure upgrade (from minimal to significant) depending on offshore wind activities intended for the site. Sites of interest include Red Hook- Brooklyn, South Brooklyn Marine Terminal, and the Port of Coeymans (NYSERDA 2017b; City of New York 2022; NYCREDC 2022; AAPA 2016; Rulison 2018; NYCEDC 2018). |

| Type | Description |
|---|---|
| | Construction is currently ongoing to upgrade the facilities at the Connecticut State Pier in New London under a long-term operating agreement (CPA Undated). Strategic objectives of the upgrades include managing and redeveloping the pier support the offshore wind industry and increase regional job growth. Redevelopment of the pier is currently ongoing (with anticipated completion in 2023), and upgrades include the creation of two heavy-lift pads and increasing the rest of the facility's load bearing capacity to meet the facility requirements of the offshore wind industry. The South Fork Wind, Revolution Wind, and Sunrise Wind projects would use the upgraded Connecticut State Pier facility (CPA Undated).<br>In Rhode Island, Ørsted 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 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 (Quonset Development Corporation 2016).<br>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, operations and maintenance 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 MCT to improve and expand services to the offshore wind industry (MassCEC 2022; Port of New Bedford 2018), but no new improvements were identified.<br>New York State proposed port improvements include upgrades to create five dedicated port facilities for offshore wind, including the following:<br>• The nation's first offshore wind tower manufacturing facility, to be built at the Port of Albany;<br>• An offshore wind turbine staging facility and operations and maintenance hub to be established at the South Brooklyn Marine Terminal;<br>• Increasing the use of the Port of Coeymans for turbine foundation manufacturing; and<br>• Buttressing ongoing operations and maintenance out of Port Jefferson and Port of Montauk Harbor in Long Island. |

MCT = Marine Commerce Terminal; MLLW = mean lower low water; NYSERDA = New York State Energy Research and Development Authority; USACE = U.S. Army Corps of Engineers

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# Appendix F
# Analysis of Incomplete and Unavailable Information and Other Required Analyses

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## Table of Contents



## List of Tables

## Abbreviations and Acronyms

| | |
|---|---|
| AIS | automatic identification system |
| BA | biological assessment |
| BOEM | Bureau of Ocean Energy Management |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| COP | Construction and Operations Plan |
| EFH | essential fish habitat |
| EIS | environmental impact statement |
| EMF | electromagnetic fields |
| ESP | electrical service platform |
| IPF | impact-producing factor |
| MARIPARS | Massachusetts and Rhode Island Port Access Route Study |
| MVR | marine vessel radar |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| OCS | Outer Continental Shelf |
| OECC | offshore export cable corridor |
| RI/MA Lease Areas | Rhode Island and Massachusetts Lease Areas |
| SME | subject matter expert |
| SWDA | Southern Wind Development Area |
| USCG | U.S. Coast Guard |
| VMS | vessel monitoring system |
| WTG | wind turbine generator |

# F Analysis of Incomplete and Unavailable Information and Other Required Analyses

## F.1 Analysis of Incomplete and Unavailable Information

In accordance with the Code of Federal Regulations, Title 40, Section 1502.21 (40 CFR § 1502.21) "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 impacts analysis of planned activities (including offshore wind), some information regarding planned activities is unavailable or only available in qualitative or summary form. For example, project-specific information is only available from the 12 Construction and Operations Plans (COP) lessees for projects on the Atlantic Outer Continental Shelf (OCS), including the COP for the proposed New England Wind Project (Project). Considering that such information is lacking for approximately 12 other offshore wind projects considered planned, and several of the COPs submitted to Bureau of Ocean Energy Management (BOEM) 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 impacts analysis. These assumptions are listed in EIS Appendix E, Planned Activities Scenario. While it is not known whether or to what degree future offshore wind activities will proceed according to these assumptions, these assumptions are adequate to allow the analysis to proceed with a reasonable degree of certainty.

In addition, information is also incomplete or unavailable regarding the likely consequences of various activities on the resources analyzed.[1] When incomplete or unavailable information was identified, BOEM considered whether the information was relevant to the impacts assessment and essential to its alternatives analysis based on the resource analyzed. If essential to a reasoned choice among the alternatives, BOEM considered whether it was possible to obtain the information, if the cost of obtaining it was exorbitant, and if it could not be obtained, BOEM applied acceptable scientific methodologies to inform the analysis considering this incomplete or unavailable information. For example, conclusive information on many impacts of the offshore wind industry may not be available for years and not within the contemplated timeframe of this National Environmental Policy Act (NEPA) process. In its place, subject matter experts (SME) have used the available scientifically credible information and accepted scientific methodologies to evaluate impacts on the resources while this information is unavailable.

## F.2 Incomplete or Unavailable Information Analysis for Resource Areas

### F.2.1 Air Quality

Although a quantitative emissions inventory analysis of the region over the next 30 years would more accurately assess the overall change in emissions from the proposed Project, any action alternative would lead to reduced emissions and can only lead to a net improvement in air quality. The differences among action alternatives with respect to direct emissions due to construction, operations, and decommissioning of the proposed Project are expected to be minimal. As such, the analysis provided in the Draft EIS is

[1] Climate change impacts would contribute to significant impacts for all resource areas. However, the resource impacts from climate change would not differ among alternatives and are not further identified here, as these impacts are not essential for a reasoned choice among alternatives.

sufficient to support sound scientific judgments and informed decision-making related to the use of the Southern Wind Development Area (SWDA) and offshore export cable corridor (OECC). Therefore, BOEM does not believe that there is incomplete or unavailable information on air quality essential to a reasoned choice among alternatives.

### F.2.2 Water Quality

No incomplete or unavailable information related to the impacts analysis on water quality was identified.

### F.2.3 Bats

There will always be some level of incomplete information on the distribution and habitat use of migratory tree bats in the SWDA, as habitat use and distribution varies among seasons and species. Additionally, there is some uncertainty regarding the potential collision risk to individual bats that may be present within the SWDA because there are no operational utility-scale offshore wind projects in the United States. However, sufficient information on collision risk to migratory tree bats observed at land-based U.S. wind projects exists, and it was used to analyze and corroborate the potential for impacts as a result of the proposed Project. In addition, as described in EIS Appendix G, Impact-Producing Factors Tables and Assessment of Resources with Minor (or Lower) Impacts, the likelihood of an individual migratory tree bat encountering an operating wind turbine generator (WTG) during migration is very low; therefore, the differences among action alternatives with respect to bats for the proposed Project are expected to be minimal. As such, the analysis provided in the Draft EIS is sufficient to support sound scientific judgments and informed decision-making related to distribution and use of the SWDA, as well as the potential for collision risk of migratory tree bats. Therefore, BOEM does not believe that there is incomplete or unavailable information on bats essential to a reasoned choice among alternatives.

### F.2.4 Benthic Resources

Although there is uncertainty regarding the temporal distribution of benthic (animal) resources and periods during which they might be especially vulnerable to disturbance, Park City Wind, LLC's (the applicant) surveys of benthic resources, surveys completed for the Final EIS for Vineyard Wind 1 adjacent to the proposed Project, and other broad-scale studies (Guida et al. 2017; The Nature Conservancy 2014) provided a suitable basis for generally predicting the species, abundances, and distributions of benthic resources in the geographic analysis area. Uncertainty also exists regarding impact-producing factors (IPF) on benthic resources. For example, species-specific stimulus-response thresholds for acoustics and electromagnetic fields (EMF) have not been established for all benthic species, but there is information from benthic monitoring at European wind facilities and the Block Island Wind Farm in the United States. Similarly, specific secondary impacts such as changes in diets through the food chain resulting from habitat modification and synergistic behavioral impacts from multiple IPFs are not fully known. Again, results of benthic monitoring at European wind facilities and the Block Island Wind Farm in the United States provide for a broad understanding of the overall impacts of these IPFs combined, if not individually. As such, the analysis provided in the Draft EIS is sufficient to support sound scientific judgments and informed decision-making related to the overall impacts. Therefore, BOEM does not believe that there is incomplete or unavailable information on benthic resources essential to a reasoned choice among alternatives.

### F.2.5 Birds

There is incomplete information on the exact migratory routes of passerines and shore birds that fly over the Atlantic OCS (including those that fly at night). Some may fly overland or along the coast before crossing the ocean. In addition, there will always be some level of incomplete information on the distribution and habitat use of marine birds in the SWDA, as habitat use and distribution varies between season, species, and years. However, the SWDA has been surveyed approximately 49 times from 2007 to 2015, and the results were used to inform the predictive models and analyze the potential impacts on birds in the Draft EIS. Additionally, 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 SWDA because there are no operational utility-scale offshore wind projects in the United States.

To put the potential for bird mortality associated with operating WTGs on the Atlantic OCS in context, the Draft EIS used some data collected at onshore wind facilities and makes assumptions regarding the applicability of these data to offshore environments. The estimated mortality provided in the Draft EIS could be larger than expected due to differences in species groups present, the life history and behavior of those species, and the offshore marine environment compared to onshore habitats. Similarly, the Draft EIS also provides an estimate of potential mortality using the Band (2012) collision risk model and Avian Stochastic collision risk model. Modeling is commonly used to predict the potential mortality rates for marine bird species in Europe and the United States (BOEM 2015, 2022a). Model inputs include monthly bird densities, flight behavior, avoidance behavior, and other factors to determine the estimated number of annual collisions with operating WTGs. Due to inherent data limitations, these models often represent only a subset of marine bird populations potentially present. Collison risk models were used to estimate the potential mortality associated with future offshore wind development. Twelve common marine bird species had sufficient species-specific information (e.g., density estimates, flight height distributions, avoidance rates) to be used in the model, and these species represent a wide range of marine bird species on the Atlantic OCS spanning five taxonomic orders. Although detailed species-specific information is not known for many of the other marine bird species that use the Atlantic OCS, many of these species are taxonomically similar and have similar ecologies as those modeled. The datasets used by both the applicant and BOEM to assess the potential for exposure of marine birds to the SWDA represent the best available data and provide context at both local and regional scales.

The regional scale assessment of potential exposure to the SWDA includes data that were collected on a large regional and temporal scale and includes aerial and boat survey data collected from 1978 to 2014 to develop long-term average annual and seasonal models. 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 proposed Project (e.g., Petersen et al. 2006; Skov et al. 2018). However, the estimates of potential collision mortality in the Draft EIS are not provided to quantify the anticipated mortality associated with the development of Atlantic offshore wind energy facilities. These estimates are not relied on to reach an impact level determination but are provided to assess the potential for collision mortality associated with the planned development on the Atlantic OCS generally and the proposed Project specifically. As such, the analysis provided in the Draft EIS is sufficient to support sound scientific judgments and informed decision-making related to bird distribution and use of the SWDA, as well as to the potential for collision risk and avoidance behaviors in bird resources. Therefore, BOEM does not believe that there is incomplete or unavailable information on birds essential to a reasoned choice among alternatives.

### F.2.6 Coastal Habitats and Fauna

No incomplete or unavailable information related to the impacts analysis on coastal habitats and fauna was identified.

### F.2.7 Finfish, Invertebrates, and Essential Fish Habitat

There is uncertainty regarding the spatial and temporal occurrence of finfish, invertebrates, and essential fish habitat (EFH) throughout the entire geographic analysis area. However, broad-scale information is available from sources such as federal fisheries management plans, Guida et al. (2017), and surveys completed to support COPs. There is also uncertainty regarding behavioral impacts from each IPF individually and combined. BOEM is able to draw on years of fish monitoring results in Europe and analogous activities in the United States (e.g., bridge construction, oil and gas platforms, etc.). Thus, BOEM extrapolated or drew assumptions from what is known about similar species and/or situations. Additional information, extrapolations, and assumptions are presented in EIS Section 3.9, Commercial Fisheries and For-Hire Recreational Fishing, references therein, the Biological Assessment (BA) (BOEM 2022a), and the EFH Assessment (BOEM 2022b). As such, the analysis provided in the Draft EIS provides sufficient information on the likely impacts of each IPF and the potential impacts that could result from the proposed Project and past, present, and planned actions. Therefore, BOEM does not believe that there is incomplete or unavailable information on finfish, invertebrates, and EFH essential to a reasoned choice among alternatives.

### F.2.8 Marine Mammals

There is some incomplete information regarding the interaction of marine mammals with EMF fields produced by submarine cables. These gaps remain partly because of difficulties in evaluating impacts at population scale around these deployments (Taormina et al. 2018). Scientific studies examining impacts of altered EMF on marine mammals have not been conducted. The large size of marine mammals and other logistical constraints make experimental studies infeasible. However, a summary of existing relevant evidence is provided in the BOEM-sponsored report by Normandeau et al. (2011) cited in EIS Section 3.7, Marine Mammals. Using this information, BOEM's SMEs have estimated that marine mammals would likely have a low risk of impacts related to EMF from submarine cables because the high mobility of marine mammals would tend to reduce exposure time.

There is uncertainty regarding the response of large whale species to new structures due to the novelty of this type of development on the Atlantic OCS. Although 2,955 new structures are anticipated under the planned activities scenario, spacing would be sufficient to allow unobstructed access within and between wind facilities. While avoidance of wind lease areas due to new structures is possible, it is unlikely due to the whales' size relative to WTG spacing. Additionally, while there is some uncertainty regarding how hydrodynamic changes around foundations may affect prey availability, these changes are expected to have limited impacts on the local conditions around WTG foundations. It is anticipated that the hydrodynamic impacts and the reef effect both may result in potential impacts on marine mammal prey species in the immediate vicinity of WTG foundations. The potential consequences of these impacts on the Atlantic OCS are unknown. Modeling conducted by Johnson et al. (2021) showed that the introduction of WTGs on the Atlantic OCS would modify current magnitude, temperature, and wave heights. Further, the modeled change in currents would lead to discernable changes in larval settlement densities on the OCS. Monitoring studies would determine if these potential changes in hydrodynamics and larval transport would result in changes in whale behavior more precisely.

There is also uncertainty regarding the combined planned activities 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 porpoises (*Phocoena phocoena*) and harbor seals (*Phoca vitulina*), as the vast majority of this research has occurred at European offshore wind projects where large whales are uncommon. At this time, it is unclear whether marine mammals would cease feeding, and when individuals would resume normal feeding, migrating, or breeding behaviors once daily pile-driving activities cease or if secondary impacts would persist. Under the planned activities scenario, individual whales may be exposed to acoustic impacts from multiple projects in 1 day or from one or more projects over the course of 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 in uncertainty. Additionally, it is currently unclear how sequential years of construction of multiple projects would affect marine mammals. However, Southall et al. (2021) have developed an analytical framework to assess the potential risk to marine mammals as a result of multiple activities over broad timescales.

Finally, there are no data relative to the impacts of elevated turbidity on marine mammals; therefore, it is conservatively assumed that normal movements may be altered. However, these movements would be too small to be meaningfully measured, and no impacts would be expected from marine mammals swimming through turbidity plumes to leave the turbid area (NOAA 2020).

BOEM believes that the overall costs of obtaining this information are exorbitant, and the means to obtain it are not known. Although the above information is unavailable, BOEM extrapolated or drew assumptions from what is known about similar species and/or situations. Additional information, extrapolations, and assumptions are presented in EIS Section 3.7, references therein, and the BA submitted to the National Marine Fisheries Service (NMFS) (BOEM 2022a). BOEM used the best available information to predict potential impacts on marine mammals, and the analysis provided in the Draft EIS is sufficient to support sound scientific judgments and informed decision-making related to the proposed uses of the SWDA. Therefore, BOEM does not believe that there is incomplete or unavailable information on marine mammals essential to a reasoned choice among alternatives.

### F.2.9 Sea Turtles

The impacts of EMF on sea turtles, both foraging and migrating, are not completely understood. However, the available relevant information is summarized in the BOEM-sponsored report by Normandeau et al. (2011) cited in EIS Section 3.8, Sea Turtles, and used in the BA for the proposed Project (BOEM 2022a). Although the thresholds for EMF disturbing various sea turtle behaviors are not known, no impacts on sea turtles from the numerous submarine power cables around the world have been documented to occur. In addition, no nesting beaches, critical habitat, or other biologically important habitats were identified in the OECC or landfall location.

There is also uncertainty relative to sea turtle responses to construction activities on the Atlantic OCS. Some potential for displacement from construction areas exists. However, if this displacement occurs, it is unclear whether individuals would be displaced into lower quality habitat or into areas with higher risk of fatal vessel interactions. Additionally, it is currently unclear whether concurrent construction of multiple projects or construction completed over sequential years would be the most impactful to sea turtles. There is also uncertainty regarding the combined planned activities acoustic impacts associated with pile-driving activities. However, it is assumed that sea turtles would resume normal feeding, migrating, or breeding behaviors once daily pile-driving activities cease. Under the planned activities scenario, individual sea turtles may be exposed to acoustic impacts from multiple projects in 1 day or from one or more projects over the course of multiple days. The consequences of these exposure scenarios have been analyzed with the best available information. Despite a lack of real-world observations on species' responses to pile driving, the anticipated impacts have been assessed on the species' hearing abilities behavior and observed responses to other impulsive sounds.

Some uncertainty exists regarding the potential for sea turtle responses to Federal Aviation Administration and navigation lighting associated with offshore wind development. Given the placement of the new structures from nesting beaches, no impacts on nesting female or hatchling sea turtles would be expected. However, at this time, it is unclear whether the required lighting on WTGs and electrical service platforms (ESP) would be visible under the water surface, and, if so, how sea turtles would respond to such light. Although the potential impacts of offshore lighting on juvenile and adult sea turtles is uncertain, WTG lighting is not anticipated to have any detectable impacts (adverse or beneficial) on any age class of sea turtles in the offshore environment; there is a lack of evidence that platform lighting leads to impacts on sea turtles, as shown by decades of oil and gas platform operation in the Gulf of Mexico, which can have considerably more lighting than offshore WTGs (BOEM 2022a).

Finally, information regarding the impacts of elevated turbidity on juvenile and adult sea turtles was not identified, although it is assumed that normal movements may be altered. However, these movements would be too small to be meaningfully measured, and no impacts would be expected from sea turtles swimming through turbidity plumes to leave the turbid area (NOAA 2021).

BOEM believes that the overall costs of obtaining this information are exorbitant, and the means to obtain it are not known. Although the above information is unavailable, BOEM extrapolated or drew assumptions from what is known about similar species and/or situations. Additional information, extrapolations, and assumptions are presented in EIS Section 3.8, references therein, and the BA submitted to NMFS (BOEM 2022a). As such, the analysis provided in the Draft EIS is sufficient to support sound scientific judgments and informed decision-making related to the proposed uses of the SWDA. BOEM used the best available information to predict potential impacts on sea turtles. Therefore, BOEM does not believe that there is incomplete or unavailable information on sea turtles essential to a reasoned choice among alternatives.

### F.2.10 Terrestrial Habitats and Fauna

Although the preferred habitats of terrestrial and coastal 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 onshore areas potentially affected by the proposed Project, and the differences among action alternatives with respect to terrestrial and coastal fauna for the proposed Project are expected to be minimal. Additionally, the onshore activities proposed involve only common, industry-standard activities for which impacts are generally understood. BOEM does not believe that there is incomplete or unavailable information on terrestrial habitats and fauna essential to a reasoned choice among alternatives.

### F.2.11 Wetlands and Other Waters of the United States

No incomplete or unavailable information related to the impacts analysis on wetlands and waters of the U.S. was identified.

### F.2.12 Commercial Fisheries and For-Hire Recreational Fishing

Fisheries are managed in the context of an incomplete understanding of fish stock dynamics and impacts of environmental factors on fish populations (EIS Section 3.6, Finfish, Invertebrates, and Essential Fish Habitat; EIS Section 3.9, Commercial Fisheries and For-Hire Recreational Fishing; Section B.2 in EIS Appendix B, Supplemental Information and Additional Figures and Tables). Although the fisheries information used in this assessment has limitations (e.g., vessel trip report data is an imprecise measurement of where fishing occurred; vessel monitoring systems (VMS) are not required of all fishing vessels; available historical data lacks consistency, making comparisons challenging), it is the best available data and is sufficient information to support the findings presented in the Draft EIS. Therefore, BOEM does not think that additional research to overcome the limitations of the best available information would be essential to a reasoned choice among alternatives.

BOEM concluded that the information provided by NMFS and described in EIS Section 3.9 and EIS Appendix B regarding commercial fisheries and for-hire recreational fishing data, as well as scientific research and surveys, is sufficient to support the impact findings presented in the Draft EIS, including how potential impacts on NMFS' scientific surveys may affect stock assessments and commercial and for-hire fishery catch quotas. Therefore, BOEM does not believe that there is incomplete or unavailable information on commercial fisheries or for-hire recreational fishing essential to a reasoned choice among alternatives.

### F.2.13 Cultural Resources

As discussed in EIS Section 3.10, Cultural Resources, the proposed Project's impacts on cultural resources may differ depending on the resource, however, the differences among alternatives are not expected to be meaningful. In the event an unanticipated discovery is made, the Unanticipated Discovery Plans for both onshore and offshore, would be implemented. Development and implementation of proposed Project-specific treatment plans, avoidance, minimization, and mitigation of identified cultural resources and mitigation and monitoring measures would be conditions of BOEM's approval of the COP. BOEM does not believe there is incomplete or unavailable information on cultural resources essential to a reasoned choice among alternatives.

### F.2.14 Demographics, Employment, and Economics

The economic analysis for the proposed Project estimated the employment and economic requirements and outputs for Alternative B, but BOEM's estimates for changes in jobs, expenditures, and economic outputs for demographic, employment, and economic impacts for Alternative C were based on comparisons with Alternative B estimate. This provided sufficient information for the evaluation of demographics, employment, and economics to support a reasoned choice among alternatives. There is some inherent uncertainty in forecasting how economic variables in various areas will evolve over time. However, the differences among action alternatives with respect to demographics, employment, and economics are not expected to be significant. Therefore, BOEM does not believe that there is incomplete or unavailable information on demographics, employment, and economics essential to a reasoned choice among alternatives.

### F.2.15 Environmental Justice

Evaluations of impacts on environmental justice communities rely on assessment of impacts on other resources. As a result, while there is no incomplete or unavailable information related to the analysis of environmental justice impacts, incomplete or unavailable information related to other resources discussed throughout EIS Chapter 3, Affected Environment and Environmental Consequences, also affect the impacts analysis on environmental justice communities. As discussed in the sections previously referenced, the incomplete and unavailable information was either not relevant to a reasoned choice among alternatives or BOEM's SMEs used alternative methods to perform an analysis that would allow for a reasoned choice among the alternatives considered. Further, the differences among action alternatives with respect to environmental justice are not expected to be significant. Therefore, BOEM does not believe that there is incomplete or unavailable information on environmental justice essential to a reasoned choice among alternatives.

### F.2.16 Land Use and Coastal Infrastructure

No incomplete or unavailable information related to the impacts analysis on land use and coastal infrastructure was identified.

### F.2.17 Navigation and Vessel Traffic

The navigation and vessel traffic impact analysis in the Draft EIS is based on automatic identification system (AIS) data from vessels required to carry AIS (i.e., those 65 feet or greater in length) since January 2016, as well as VMS data for individual vessel trips. VMS data for fishing vessels provided to BOEM by NMFS were the basis for polar histograms and other analytical outputs used in evaluating commercial and for-hire recreational fishing trips (EIS Section 3.13, Navigation and Vessel Traffic). The Navigational Risk Assessment for the COP (Appendix III-I; Epsilon 2022) also includes observations about VMS data, based on maps of 2016 to 2019 VMS data provided by NMFS and the Northeast Regional Ocean Council, as well as BOEM's own data analysis. These observations supplement the AIS data by identifying areas of fishing vessel concentration within the SWDA and surrounding area. Some smaller recreational and fishing vessels carry an AIS; however, the AIS analysis likely excludes most vessels less than 65 feet long that traverse the SWDA. In addition, the VMS data provided by NMFS exclude some non-federally managed commercial fishing, federally managed commercial fishing that does not require VMS, as well as recreational fishing vessel trips through the SWDA and across the OECC. Nonetheless, the combination of AIS and VMS data described above represent the best available vessel traffic data and is sufficient for BOEM to make a reasoned choice among alternatives.

The U.S. Coast Guard's (USCG) Final Massachusetts and Rhode Island Port Access Route Study (MARIPARS), evaluating the need for establishing vessel routing measures, was published in the *Federal Register*, Volume 85, Issue 19 (January 29, 2020) pp. 5222-5224 (85 Fed. Reg. 19 pp. 5222-5224) (USCG 2020). The Final MARIPARS recommended an aligned, regular, and gridded layout throughout the Rhode Island and Massachusetts Lease Areas (RI/MA Lease Areas) that provides adequate sea room to facilitate predictable safe navigation throughout the contiguous leases. The recommendation includes three "lines of orientation," or predictable headings that vessels can take at any location within the contiguous lease areas. The Final MARIPARS stated that 1-nautical-mile-wide (1.15-mile-wide) east-to-west paths would facilitate traditional fishing methods in the area, and 1-nautical-mile-wide north-to-south paths would provide the USCG with adequate access for search and rescue access. Finally, 0.6- to 0.8-nautical-mile-wide (0.7- to 0.9-mile-wide) northwest-to-southeast paths would allow commercial fishing vessels to continue their travel from port, through the lease areas, and to fishing grounds. The leaseholders for offshore wind projects in the RI/MA Lease Areas have proposed a collaborative regional layout for wind turbines (an east-to-west, north-to-south grid pattern with 1 nautical mile [1.9 kilometers, 1.15 miles] × 1 nautical mile [1.9 kilometers, 1.15 miles] spacing between positions and with 0.7-nautical-mile [0.8-mile] theoretical transit routes oriented northwest-to-southeast) across their respective BOEM leases (Geijerstam et al. 2019) that meets the layout rules set forth in the Final MARIPARS recommendations. As a cooperating agency, the USCG will continue to consult with BOEM over the course of the NEPA process for the proposed Project as it relates to navigational safety and other aspects, including the impacts associated with alternatives assessed.

As stated in EIS Section 3.14, Other Uses (National Security and Military Use, Aviation and Air Traffic, Offshore Cables and Pipelines, Radar Systems, Scientific Research and Surveys, and Marine Minerals), WTG and ESP structures could potentially interfere with marine radars. A 2022 National Academies of Sciences study found impacts on marine vessel radar (MVR) from offshore WTGs (NAS 2022). Specifically, the study found that offshore WTGs affect MVR in some situations, most commonly through a substantial increase in strong reflected energy cluttering the operator's display, leading to complications in navigation decision-making (NAS 2022). The sizes of anticipated offshore WTGs and projects would exacerbate these impacts (NAS 2022). This decreased efficacy applies to both traditional, magnetron-based MVRs, and solid-state MVRs. Degraded effectiveness of MVR could lead to lost contact with smaller objects, such as recreational vessels and buoys (NAS 2022). MVRs have varied capabilities and the ability of radar equipment to properly detect objects is dependent on radar type, equipment placement, and operator proficiency; however, trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS would all enable safe navigation with minimal loss of radar detection (USCG 2020). The National Academies of Sciences study also found that WTG-related MVR interference could be lessened through improved radar signal processing and display logic or signature-enhancing reflectors on small vessels to minimize lost contacts.

Based on the foregoing, BOEM does not believe that there is incomplete or unavailable information on navigation and vessel traffic essential to a reasoned choice among alternatives.

### F.2.18 Other Uses (National Security and Military Use, Aviation and Air Traffic, Offshore Cables and Pipelines, Radar Systems, Scientific Research and Surveys, and Marine Minerals)

There is no incomplete or unavailable information related to the analysis of other uses (national security and military use, aviation and air traffic, offshore cables and pipelines, radar systems, scientific research and surveys, and marine minerals), aside from the aspects described in this appendix for the proposed Project, the planned offshore wind projects for which BOEM has not received COPs, and land-based radar systems.

As discussed in EIS Section 3.14 and Appendix B, preliminary analyses of the impacts on survey areal coverage show substantial impacts on NMFS' ability to continue using current methods to fulfill its mission of precisely and accurately assessing fish and shellfish stocks for the purpose of fisheries management and assessing protected species for the purpose of protected species management. EIS Section 3.14 and Section B.3 in Appendix B also discuss potential approaches and opportunities to lessen impacts on scientific research and surveys in the long term. Regardless of such actions, long-standing NMFS surveys would not be able to continue as currently designed, and extensive costs and efforts would be required to adjust survey approaches. As a result, BOEM has concluded that the information provided by the National Oceanic and Atmospheric Administration (NOAA) in EIS Section 3.14 regarding scientific research and surveys are sufficient to support the impact findings presented in the Draft EIS. Therefore, BOEM does not believe that there is incomplete or unavailable information on other uses essential to a reasoned choice among alternatives.

### F.2.19 Recreation and Tourism

No incomplete or unavailable information related to the impacts analysis on recreation and tourism was identified.

### F.2.20 Scenic and Visual Resources

As discussed in EIS Section 3.16, Scenic and Visual Resources, WTGs in the RI/MA Lease Areas could potentially be visible to viewers on shore and at sea, depending on atmospheric, lighting, and weather conditions. The design characteristics of WTGs (most notably the height of the tops of WTG nacelles, as well as the maximum height of WTG blade tips at full vertical extension) for many projects have not yet been determined. EIS Section 3.16, as well as EIS Appendix I, Seascape and Landscape Visual Impact Assessment, describe the assumptions about WTG characteristics that underlie the analysis of visual impacts in the Draft EIS. While the actual WTGs may differ from the assumed WTG characteristics, those differences are unlikely to change the impact determinations in the Draft EIS. As a result, BOEM does not believe that there is incomplete or unavailable information on scenic and visual resources essential to a reasoned choice among alternatives.

## F.3 Unavoidable Adverse Impacts of the Proposed Action

The Council on Environmental Quality's (CEQ) regulations for implementing NEPA (Code of Federal Regulations, Title 40, Section 1502.16 [40 CFR § 1502.16]) require that an EIS evaluate the potential unavoidable adverse impacts associated with a proposed action. Adverse impacts that can be reduced by mitigation and monitoring measures but not eliminated are considered unavoidable. Table F.3-1 provides a listing of such impacts. Most potential unavoidable adverse impacts associated with the Proposed Action would occur during construction and would be temporary. EIS Chapter 3 and Appendix B provide additional information on the potential impacts listed below.

All impacts from past, present, and planned activities are still expected to occur as described in the No Action Alternative analysis in the Draft EIS, regardless of whether the Proposed Action is approved.

**Table F.3-1: Potential Unavoidable Adverse Impacts of the Proposed Action**

| Resource Area | Potential Unavoidable Adverse Impacts of the Proposed Action |
|---|---|
| Air Quality | • Increase in emissions from engines associated with vessel traffic, construction activities, and equipment operation |
| Water Quality | • Increase in suspended sediments due to seafloor disturbance during construction, operations, and decommissioning |
| Bats | • Displacement and avoidance behavior due to habitat loss/alteration, equipment noise, and vessel traffic<br>• Increase in individual mortality due to collisions with operating WTGs |
| Benthic Resources | • Increase in suspended sediments and resulting impacts due to seafloor disturbance<br>• Reduction in habitat as a result of seafloor surface alternations<br>• Disturbance, displacement, and avoidance behavior due to habitat loss/alteration, equipment noise, and vessel traffic<br>• Increase in individual mortality due to construction<br>• Conversion of soft-bottom habitat to new hard-bottom habitat |
| Birds | • Displacement and avoidance behavior due to habitat loss/alteration, equipment noise, and vessel traffic<br>• Increase in individual mortality due to collisions with operating WTGs |
| Coastal Habitats and Fauna | • Increase in suspended sediments and reduction in habitat quality due to seafloor disturbance |
| Finfish, Invertebrates, and Essential Fish Habitat | • Increase in suspended sediments and resulting impacts due to seafloor disturbance<br>• Habitat quality alterations or loss of habitat<br>• Displacement, disturbance, and avoidance behavior due to habitat loss/alteration, equipment noise, vessel traffic, increased turbidity, sediment deposition, and EMF<br>• Increase in individual mortality due to construction activities |
| Marine Mammals | • Displacement, disturbance, and avoidance behavior due to habitat loss/alteration, equipment and vessel noise, and vessel traffic during construction and operations<br>• Temporary loss of acoustic habitat and increased potential for vessel strikes<br>• Increased risk for injury or mortality associated with fisheries gear |
| Sea Turtles | • Disturbance, displacement, and avoidance behavior due to habitat loss/alteration, equipment noise<br>• Increased potential for vessel strikes<br>• Increased risk for injury or mortality associated with fisheries gear |
| Terrestrial Habitats and Fauna | • Habitat alteration-induced impacts, avoidance behavior, and individual mortality due to clearing and grading activities |
| Wetlands and Other Waters of the United States | • Increase in low-level sedimentation of wetlands and other waters of the U.S. during onshore construction |
| Commercial Fisheries and For-Hire Recreational Fishing | • Disruption to access or temporary restriction in harvesting activities due to construction of offshore proposed Project elements<br>• Disruption to harvesting activities during operations of offshore wind facility<br>• Changes in vessel transit and fishing operation patterns |
| Cultural Resources | • Impacts on viewsheds of and to historic properties<br>• Damage to underwater paleo and form features |
| Demographics, Employment, and Economics | • Disruption of commercial fishing, for-hire recreational fishing, and marine recreational businesses during offshore construction and cable installation<br>• Hindrance 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 | • Loss of employment or income due to disruption to commercial fishing, for-hire recreational fishing, or marine recreation businesses<br>• Hindrance to subsistence fishing due to offshore construction and operation of the offshore wind facility |

| Resource Area | Potential Unavoidable Adverse Impacts of the Proposed Action |
|---|---|
| Land Use and Coastal Infrastructure | • Land use disturbance due to construction, as well as noise, vibration, and travel delays<br>• Increase in potential for accidental releases during construction |
| Navigation and Vessel Traffic | • Change in vessel transit patterns<br>• Congestion in port channels<br>• Increased navigational complexity, vessel congestion, and allision risk within the offshore SWDA<br>• Hindrance to search and rescue missions within the offshore SWDA |
| Other Uses (National Security and Military Use, Aviation and Air Traffic, Offshore Cables and Pipelines, Radar Systems, Scientific Research and Surveys, and Marine Minerals) | • Disruption to offshore scientific research and surveys and species monitoring and assessment<br>• Increased navigational complexity for military or national security vessels operating within the offshore SWDA<br>• Need for changes in vessel transit patterns for military or national security vessels<br>• Changes to aviation and air traffic navigation patterns<br>• Impacts on marine-based radar systems when close to the WTGs |
| Recreation and Tourism | • Disruption of coastal recreation activities during onshore construction, such as beach access<br>• Alteration of marine and coastal recreation enjoyment and tourism activities due to WTGs<br>• Disruption to access or temporary restriction of in-water recreational activities due to construction of offshore proposed Project elements<br>• Temporary disruption to the marine environment and marine species important to fishing and sightseeing due to turbidity and noise<br>• Hindrance to some types of recreational fishing, sailing, and boating within the area occupied by WTGs during operation |
| Scenic and Visual Resources | • Alteration of existing scenic conditions due to WTGs, as well as viewer experiences |

EMF = electromagnetic fields; SWDA = Southern Wind Development Area; WTG = wind turbine generator

## F.4 Irreversible and Irretrievable Commitment of Resources

The CEQ regulations for implementing NEPA (40 CFR § 1502.16) require that an EIS review the potential impacts on irreversible or irretrievable commitments of resources resulting from implementation of a proposed action. The CEQ considers a commitment of a resource irreversible when the primary or secondary impacts from its use limit the future options for its use. Irreversible commitment of resources typically applies to impacts of non-renewable resources, such as marine minerals or cultural resources. The irreversible commitment of resources occurs due to the use or destruction of a specific resource. An irretrievable commitment refers to the use, loss, or consumption of a resource, particularly a renewable resource, for a period of time.

Table F.4-1 provides a listing of potential irreversible and irretrievable impacts by resource area. EIS Chapter 3 and Appendix B provide additional information on the impacts summarized below.

**Table F.4-1: Irreversible and Irretrievable Commitment of Resources by Resource Area**

| Resource Area | Irreversible Impacts | Irretrievable Impacts | Explanation |
|---|---|---|---|
| Air Quality | No | No | Air emissions would comply with permits regulating air quality standards, and emissions would be temporary during construction. If the Proposed Action displaces fossil-fuel energy generation, overall improvement of air quality would be expected. |
| Water Quality | No | No | Activities would not cause loss of, or significant impacts on, existing inland waterbodies or wetlands. Turbidity impacts in the marine and coastal environment would be temporary. |
| Bats | Yes | No | Irreversible impacts on bats could occur if one or more individuals were injured or killed; however, implementation of mitigation and monitoring measures developed in consultation with the U.S. Fish and Wildlife Service would reduce or eliminate the potential for such impacts. Decommissioning of the proposed Project would reverse the impacts of being displaced from foraging habitat. |
| Benthic Resources | No | No | Although local mortality could occur, there would not be population-level impacts on benthic organisms; habitat could recover after decommissioning. |
| Birds | Yes | No | Irreversible impacts on birds could occur if one or more individuals were injured or killed; however, implementation of mitigation and monitoring measures developed in consultation with the U.S. Fish and Wildlife Service would reduce or eliminate the potential for such impacts. Decommissioning of the proposed Project would reverse the impacts of being displaced from foraging habitat. |
| Coastal Habitats and Fauna | No | No | Any turbidity impacts would be short term and not lead to irreversible or irretrievable impacts. Changes in seabed composition/habitat as a result of cable protection could result in minimal beneficial impacts. |
| Finfish, Invertebrates, and Essential Fish Habitat | No | No | Although local mortality could occur, there would not be population-level impacts. The proposed Project could alter habitat during construction and operations but could restore the habitat after decommissioning. |
| Marine Mammals | Yes | Yes | Irreversible impacts on marine mammals could occur if one or more individuals of species listed under the Endangered Species Act were injured or killed; however, implementation of mitigation and monitoring measures, developed in consultation with NMFS, 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 proposed Project area. |
| Sea Turtles | Yes | Yes | Irreversible impacts on sea turtles could occur if one or more individuals of species listed under the Endangered Species Act were injured or killed; however, implementation of mitigation and monitoring measures, developed in consultation with NMFS, 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 proposed Project area. |
| Terrestrial Habitats and Fauna | Yes | Yes | Removal of habitat associated with clearing and grading activities, as well as construction of the substation, could potentially create irreversible and irretrievable impacts. |

| **Resource Area** | **Irreversible Impacts** | **Irretrievable Impacts** | **Explanation** |
|---|---|---|---|
| Wetlands and Other Waters of the United States | No | No | Although localized and temporary impacts on wetlands and other waters of the U.S. could occur, the resource is expected to recover to existing conditions without remedial or mitigating actions. |
| Commercial Fisheries and For-Hire Recreational Fishing | No | Yes | Although impacts on commercial fisheries would not result in irreversible impacts. the proposed Project could alter habitat during construction and operations, limit access to fishing areas during construction, or reduce vessel maneuverability during operations. However, the decommissioning of the proposed Project would reverse those impacts. Irretrievable impacts could occur due to the loss of use of fishing areas at an individual permit level. |
| Cultural Resources | Yes | Yes | Although unlikely, unanticipated removal or disturbance of previously unidentified cultural resources onshore and offshore could result in irreversible and irretrievable impacts. |
| Demographics, Employment, and Economics | No | Yes | There would not be any irreversible impacts. A temporary increase of contractor needs, housing needs, and supply requirements could occur during construction. This could lead to an irretrievable loss of workers for other projects, and increased housing and supply costs. |
| Environmental Justice | No | Yes | Impacts on environmental justice communities could occur due to loss of income or employment for low-income workers in marine industries; this could be reversed by proposed Project decommissioning or other employment, but income lost during proposed Project operations would be irretrievable. |
| Land Use and Coastal Infrastructure | Yes | Yes | Onshore facilities may or may not be decommissioned; if not decommissioned, the presence of these facilities could lead to irreversible impacts. Land use required for construction and operations, such as the land proposed for the substation, could result in an irreversible impact. Construction activities could result in an irretrievable impact due to the temporary loss of use of the land for otherwise typical activities. |
| Navigation and Vessel Traffic | No | Yes | There would not be any irreversible impacts. Based on the anticipated duration of construction and operations, impacts on vessel traffic would not result in irreversible impacts. Irretrievable impacts could occur due to changes in transit routes, which could be less efficient during the life of the proposed Project. |
| Other Uses (National Security and Military Use, Aviation and Air Traffic, Offshore Cables and Pipelines, Radar Systems, Scientific Research and Surveys, and Marine Minerals) | No | Yes | Disruption of offshore scientific research and surveys would occur during proposed Project construction, operations, and decommissioning. |
| Recreation and Tourism | No | No | Construction activities near the shore could result in a temporary loss of use of the land for recreation and tourism purposes. |
| Scenic and Visual Resources | No | No | Visual impacts associated with the construction and operations of WTGs that are visible from shore would be reversed once those structures are decommissioned and removed. |

BOEM = Bureau of Ocean Energy Management; NMFS = National Marine Fisheries Service; WTG = wind turbine generator

## F.5 Relationship Between the Short-Term Use of the Environment and the Maintenance and Enhancement of Long-Term Productivity

The CEQ regulations for implementing NEPA (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 impacts is whether the short-term environmental impacts of the action would result in detrimental impacts on long-term productivity of the affected areas or resources.

As assessed in EIS Chapter 3 and Appendix B, the majority of the potential impacts associated with the Proposed Action would occur during construction and be short term in nature. These impacts would cease after decommissioning. In assessing the relationships between short-term use of the environment and the maintenance and enhancement of long-term productivity, it is important to consider the long-term benefits of the Proposed Action, which include:

- 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 energy grid to contribute to the renewable energy requirements of Connecticut and Massachusetts, particularly Connecticut's mandate to obtain 2,000 megawatts of offshore wind energy by 2030 (as outlined in Connecticut Public Act 19-71) and the Massachusetts requirement that distribution companies jointly and competitively solicit proposals for offshore wind energy generation (Title 220 of the Code of Massachusetts Regulations, Section 23.04(5)); and
- Expansion of habitat for certain fish species.

Based on the anticipated potential impacts evaluated in the Draft EIS that could occur during Proposed Action construction, operations, and decommissioning, and with the exception of some potential impacts associated with onshore components, the Proposed Action would not result in impacts that would significantly narrow the range of future uses of the environment. Removal or disturbance of habitat associated with onshore activities (e.g., construction of the proposed substation) could create long-term irreversible impacts. For purposes of this analysis, BOEM assumes that the irreversible impacts presented in Section F.3 would be long term. After completion of the Proposed Action's operations and decommissioning stages, however, the majority of marine and onshore environments to return to normal long-term productivity levels.

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# Appendix G
# Impact-Producing Factor Tables and Assessment of Resources with Minor (or Lower) Impacts

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# Table of Contents



# List of Tables

## List of Figures

## Abbreviations and Acronyms

| | |
|---|---|
| § | Section |
| °C | degrees Celsius |
| μg/L | micrograms per liter |
| μT | microtesla |
| AC | alternating current |
| ADLS | aircraft detection lighting system |
| BA | Biological Assessment |
| BMP | best management practice |
| BOEM | Bureau of Ocean Energy Management |
| BSEE | Bureau of Safety and Environmental Enforcement |
| Btu | British thermal unit |
| CAA | Clean Air Act |
| CFR | Code of Federal Regulations |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| $CO_2e$ | carbon dioxide equivalent |
| COP | Construction and Operations Plan |
| CRM | collision risk model |
| CTV | crew transfer vessel |
| CWA | Clean Water Act |
| DC | direct current |
| DOE | U.S. Department of Energy |
| EFH | essential fish habitat |
| EIS | Environmental Impact Statement |
| EMF | electric and magnetic fields |
| ESA | Endangered Species Act |
| ESP | electrical service platform |
| FAA | Federal Aviation Administration |
| FAD | fish aggregating device |
| FCC | Federal Communications Commission |
| Fed. Reg. | Federal Register |
| FMP | Fisheries Management Plan |
| G&G | geological and geophysical |
| GHG | greenhouse gas |
| HAP | hazardous air pollutant |
| HDD | horizontal directional drilling or drill |
| HDM | hydrodynamic model |
| HUC | hydrologic unit code |
| IHA | Incidental Harassment Authorization |
| IPF | impact-producing factor |
| LME | Large Marine Ecosystem |
| MARPOL | International Convention for the Prevention of Pollution from Ships |
| MassDEP | Massachusetts Department of Environmental Protection |
| MBTA | Migratory Bird Treaty Act |
| MCT | Marine Commerce Terminal |
| mg/L | milligrams per liter |
| MOU | Memorandum of Understanding |
| MW | megawatt |
| MWh | megawatt hour |
| NA | not applicable |
| NAAQS | National Ambient Air Quality Standards |

| | |
|---|---|
| NARW | North Atlantic right whale |
| ND | no data |
| NEPA | National Environmental Policy Act |
| NOA | Notice of Availability |
| $NO_x$ | nitrogen oxide |
| $NO_2$ | nitrogen dioxide |
| NOAA | National Oceanic and Atmospheric Administration |
| NPDES | National Pollutant Discharge Elimination System |
| NTU | nephelometric turbidity unit |
| $O_3$ | ozone |
| OCS | Outer Continental Shelf |
| OECC | offshore export cable corridor |
| OECR | onshore export cable route |
| OSRP | oil spill response plan |
| PDE | Project design envelope |
| $PM_{2.5}$ | particulate matter smaller than 2.5 microns |
| $PM_{10}$ | particulate matter smaller than 10 microns |
| ProvPort | Port of Providence |
| ppb | parts per billion |
| Project | New England Wind Project |
| psu | practical salinity unit |
| PTS | permanent threshold shift |
| RI/MA Lease Areas | Rhode Island and Massachusetts Lease Areas |
| RMS | root mean squared |
| ROW | right-of-way |
| SAR | search and rescue |
| SCV | South Coast Variant |
| $SO_2$ | sulfur dioxide |
| SOC | standard operating condition |
| SOV | service operation vessel |
| SPL | sound pressure level |
| SWDA | Southern Wind Development Area |
| TCP | traditional cultural property |
| TMP | Traffic Management Plan |
| TSS | total suspended solids |
| TTS | temporary threshold shift |
| USACE | U.S. Army Corps of Engineers |
| USC | U.S. Code |
| USCG | U.S. Coast Guard |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | U.S. Fish and Wildlife Service |
| VOC | volatile organic compound |
| WNS | white nose syndrome |
| WTG | wind turbine generator |

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# G Impact-Producing Factor Tables and Assessment of Resources with Minor (or Lower) Impacts

This appendix provides tables that discuss the individual impact-producing factors (IPF) that form the basis of the analyses in Chapter 3, Affected Environment and Environmental Consequences, of the Environmental Impact Statement (EIS). It also includes the assessment of resources for which the New England Wind Project (proposed Project) would generate no more than minor impacts.

## G.1 Impact-Producing Factor Tables

**Table G.1-1: Summary of Activities and the Associated Impact-Producing Factors for Benthic Resources**

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Accidental releases | EIS Section G.2.2, Water Quality, discusses ongoing accidental releases. Accidental releases of hazardous materials 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 non-toxic levels before they affect benthic resources. The corresponding impacts on benthic resources are rarely noticeable.<br><br>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.<br><br>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 cables, lines and pipeline laying. However, there does not appear to be evidence that ongoing releases have detectable impacts on benthic resources. | Gradually increasing vessel traffic over the next 30 years would increase the risk of accidental releases. EIS Section G.2.2 discusses water quality.<br><br>No future activities related to invasive species or releases of trash and debris were identified within the geographic analysis area other than ongoing activities. |
| Anchoring and gear utilization | 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 physical contact to cause injury and mortality of benthic resources, as well as physical damage to their habitats. 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. | No future activities were identified within the geographic analysis area other than ongoing activities. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Cable emplacement and maintenance | Cable emplacement and maintenance activities infrequently disturb benthic resources and cause temporary increases in suspended sediment; these disturbances would be local and limited to the emplacement corridor. In the geographic analysis area, there are six existing power cables (see BOEM 2019a for details). New cables are infrequently added near shore. Cable emplacement and 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.<br><br>Ongoing sediment dredging for navigation purposes results in localized, short-term impacts (habitat alteration, injury, and mortality) on benthic resources through seabed profile alterations. For example, the Town of Barnstable and Barnstable County typically undertake 10 to 20 dredging projects per year. Dredging typically occurs only in sandy or silty habitats, which are abundant in the geographic analysis area and quick to recover from disturbance. Therefore, such impacts, while locally intense, have little impact on benthic resources in the geographic analysis area.<br><br>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 affect some benthic resources, especially eggs and larvae, including smothering and loss of fitness. Impacts may vary based on season/time of year. The Town of Barnstable and Barnstable County typically undertake 10 to 20 dredging projects per 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. | No future activities were identified within the geographic analysis area other than ongoing activities.<br><br>The USACE and/or private ports may 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. |
| Climate change | Ongoing $CO_2$ emissions causing ocean acidification may contribute to reduced growth or the decline of benthic invertebrates that have calcareous shells, as well as reefs and other habitats formed by shells.<br><br>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 and migration of benthic species and altering ecological relationships, likely causing permanent changes of unknown intensity gradually over the next 30 years. | No future activities were identified within the geographic analysis area other than ongoing activities. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Discharges/intakes | The gradually increasing amount of vessel traffic is increasing the total 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 on benthic resources are short term because spoils are typically recolonized naturally. In addition, the USEPA 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. |
| EMF | EMF continuously emanate from existing telecommunication and electrical power transmission cables. In the geographic analysis area, there are six existing power cables connecting Martha's Vineyard and Nantucket to the mainland. New cables generating EMF are infrequently installed in the geographic analysis area. Some benthic species can detect EMF, although EMF do not appear to present a barrier to movement.<br><br>The extent of impacts (behavioral changes) is likely less than 50 feet 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. |
| Noise | Detectable impacts of construction and G&G noise on benthic resources rarely, if ever, overlap from multiple sources.<br><br>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 seabed can cause injury and/or mortality to benthic resources in a small area around each pile and short-term stress and behavioral changes to individuals over a greater area. The extent depends on pile size, hammer energy, and local acoustic conditions.<br><br>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. | Detectable impacts of construction and G&G noise on benthic resources would rarely, if ever, overlap from multiple sources.<br><br>No future pile driving activities were identified within the geographic analysis area other than ongoing activities.<br><br>New or expanded submarine cables and pipelines are likely to occur in the geographic analysis area. These disturbances would be infrequent over the next 30 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. |
| Port utilization | 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, including dredging. Port utilization is expected to increase over the next 30 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 may continue to increase in the foreseeable future. In addition, the general trend along the coast from Virginia to Maine is that port activity will increase modestly. The ability of ports to receive the increase may require port modifications, leading to local impacts. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | | Future channel-deepening activities will likely be undertaken. Existing ports have already affected finfish, invertebrates, 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, impacts on EFH for certain species and/or life stages may lead to impacts on finfish and invertebrates beyond the vicinity of the port. |
| Presence of structures | 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 short-term and localized impacts.<br><br>Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, continuously create uncommon relief and uncommon hard-bottom habitat in a mostly sandy seascape and can affect natural hydrodynamic conditions.<br><br>Structure-oriented fishes are attracted to these locations. Increased predation upon benthic resources by structure-oriented fishes can affect populations and communities of benthic resources. These impacts are local and permanent. Benthic species dependent on hard-bottom habitat can benefit on a constant basis, although the new habitat can also be 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.<br><br>The presence of transmission cable infrastructure, especially hard protection atop cables, causes impacts through entanglement/gear loss/damage, fish aggregation, and habitat conversion.<br><br>Ongoing commercial and recreational regulations for finfish and shellfish implemented and enforced by Massachusetts, towns, and/or NOAA, depending on jurisdiction, affect benthic resources by modifying the nature, distribution, and intensity of fishing-related impacts, including those that disturb the seafloor (trawling, dredge fishing). | Future new cables, perhaps connecting Martha's Vineyard and/or Nantucket to the mainland, would present additional risk of gear loss, resulting in short-term and localized impacts (disturbance, injury).<br><br>New cables installed in the geographic analysis area over the next 30 years would likely require hard protection atop portions of the route (see the cable emplacement and maintenance IPF in this table). Any new towers, buoy, or piers would also create uncommon relief in a mostly flat, sandy seascape and could alter hydrodynamic conditions.<br><br>Structure-oriented fishes could be attracted to these locations. Increased predation upon benthic resources by structure-oriented fishes could affect populations and communities of benthic resources. These impacts are expected to be local and permanent as long as the structures remain. 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). Soft bottom is the dominant habitat type in the region, and species that rely on this habitat would not likely experience population-level impacts (Guida et al. 2017; Greene et al. 2010).<br><br>No future activities were identified within the geographic analysis area other than ongoing activities. |

BMP = best management practice; BOEM = Bureau of Ocean Energy Management; $CO_2$ = carbon dioxide; EFH = essential fish habitat; EIS = Environmental Impact Statement; EMF = electromagnetic fields; G&G = geological and geophysical; GHG = greenhouse gas; IPF = impact-producing factor; NOAA = National Oceanic and Atmospheric Administration; OCS = Outer Continental Shelf; USACE = U.S. Army Corps of Engineers; USEPA = U.S. Environmental Protection Agency

**Table G.1-2: Summary of Activities and the Associated Impact-Producing Factors for Coastal Habitats and Fauna**

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Accidental releases | Accidental releases of fuel, fluids, and hazardous materials have the potential to cause habitat contamination and harm to the species that build biogenic coastal habitats and fauna (e.g., eelgrass, oysters, mussels, snails, and cordgrass) from releases and/or cleanup activities. Only a portion of the ongoing releases contact coastal habitats and fauna in the geographic analysis area. Impacts are minimal, localized, and temporary.<br><br>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 cables, lines and pipeline laying. As population and vessel traffic increase, accidental releases of trash and debris may increase. Such materials may be obvious when they come to rest on shorelines; however, there does not appear to be evidence that the volumes and extents would have any detectable impact on coastal habitats and fauna. | No future activities were identified within the geographic analysis area other than ongoing activities. |
| Anchoring and gear utilization | Vessel anchoring related to ongoing military, survey, commercial, and recreational activities will continue to cause temporary to permanent impacts in the immediate area where anchors and chains meet the seafloor. These impacts include increased turbidity levels and potential for contact to cause physical damage to coastal habitats and fauna. All impacts are localized; turbidity is short term and temporary; physical damage can be permanent if it occurs in eelgrass beds or hard bottom. | No future activities were identified within the geographic analysis area other than ongoing activities. |
| Cable emplacement and maintenance | There are no existing cables in the geographic analysis area. Any cable emplacement and maintenance activities would infrequently disturb bottom sediments; these disturbances would be local and limited to the emplacement.<br><br>Ongoing sediment dredging for navigation purposes results in fine sediment deposition within coastal habitats and fauna. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local and limited to the emplacement corridor.<br><br>Ongoing sediment dredging for navigation purposes also results in localized and short-term impacts on coastal habitats and fauna through seabed profile alterations. For example, the Town of Barnstable and Barnstable County typically undertake multiple dredging projects each year (Barnstable County 2022; CapeCod.com 2019). Dredging typically occurs only in sandy or silty habitats, which are abundant in the geographic analysis area and quick to recover from disturbance. Therefore, such impacts, while locally intense, have little effect on the general character of coastal habitats and fauna. | No future activities were identified within the geographic analysis area other than ongoing activities. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
| --- | --- | --- |
| | No dredged material disposal sites were identified within the geographic analysis area. | |
| Climate change | Ongoing $CO_2$ emissions causing ocean acidification may contribute to reduced growth or the decline of reefs and other habitats formed by shells.<br><br>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. |
| EMF | EMF continuously emanate from existing telecommunication and electrical power transmission cables. There are no existing cables in the geographic analysis area for coastal habitats and fauna. New cables generating EMF are infrequently installed in the geographic analysis area. EIS Sections 3.4 and 3.6 discuss the nature of potential impacts on benthic resources and finfish, invertebrates, and EFH, respectively. The extent of impacts is likely less than 50 feet from the cable, and the intensity of impacts on coastal habitats and fauna is likely undetectable. | No future activities were identified within the geographic analysis area other than ongoing activities. |
| Land disturbance | Ongoing development and construction of onshore properties, especially shoreline parcels, periodically causes short-term erosion and sedimentation of coastal habitats, short-term to permanent degradation of onshore coastal habitats, and the conversion of onshore coastal habitats to developed space. | No future activities were identified within the geographic analysis area other than ongoing activities. |
| Lighting | Navigation lights and deck lights on vessels are a source of ongoing light. EIS Sections 3.4 and 3.6 discuss the nature of potential impacts on benthic resources and finfish, invertebrates, and EFH, respectively. The extent of impacts is limited to the immediate vicinity of the lights, and the intensity of impacts on coastal habitats and fauna is likely undetectable.<br><br>Existing lights from navigational aids and other structures onshore and nearshore are a source of light. EIS Sections 3.2 and 3.3 discuss the nature of potential impacts. The extent of impacts is likely limited to the immediate vicinity of the lights, and the intensity of impacts on coastal habitats and fauna is likely undetectable. | Light is expected to continue to increase gradually with increasing vessel traffic over the next 30 years. EIS Sections 3.2 and 3.3 discuss the nature of potential impacts. The extent of impacts would likely be limited to the immediate vicinity of the lights, and the intensity of impacts on coastal habitats and fauna would likely be undetectable. |
| Noise | Ongoing noise from construction occurs frequently near shores of populated areas in New England and the mid-Atlantic but infrequently offshore. Noise from construction near shore 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 | Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 30 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise that penetrates deep into the seabed. Site characterization surveys typically use sub-bottom profiler technologies that generate less-intense sound waves similar to common deep-water |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | difficult to generalize, but impacts are local and temporary.<br><br>Site characterization surveys and scientific surveys are ongoing. The intensity and extent of the resulting impacts are difficult to generalize but are local and temporary.<br><br>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 seabed can reach coastal habitats and fauna. The extent depends on pile size, hammer energy, and local acoustic conditions.<br><br>Rare ongoing trenching for pipeline and cable-laying activities emits noise; cable burial via jet embedment also causes similar noise impacts. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise on coastal habitats and fauna are discountable compared to the impacts of the physical disturbance and sediment suspension. | echosounders. The intensity and extent of the resulting impacts are difficult to generalize but are likely local and temporary.<br><br>New or expanded submarine cables and pipelines may occur in the geographic analysis area infrequently over the next 30 years. These disturbances would be temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise on coastal habitats and fauna are discountable compared to the impacts of the physical disturbance and sediment suspension. |
| Presence of structures | Various structures, including pilings, piers, towers, riprap, buoys, and various means of hard protection, are periodically added to the seascape, creating uncommon vertical relief in a mostly flat seascape and converting previously existing habitat (whether hard bottom or soft bottom) to a type of hard habitat, although it differs from the typical hard-bottom habitat in the geographic analysis area, namely, coarse substrates in a sand matrix. The new habitat may or may not function similarly to hard-bottom habitat typical in the region (Kerckhof et al. 2019; HDR 2019). Soft bottom is the dominant habitat type on the OCS, and structures do not meaningfully reduce the amount of soft-bottom habitat available (Guida et al. 2017; Greene et al. 2010). Structures can also create an artificial reef effect, attracting a different community of organisms.<br><br>Various means of hard protection atop existing cables can create uncommon hard-bottom habitat. Where cables are buried deeply enough that protection is not used, presence of the cable and infrastructure have no impact on coastal habitats and fauna. There are no existing cables in the geographic analysis area for coastal habitats and fauna. | Any new cable or pipeline installed in the geographic analysis area would likely require hard protection atop portions of the route (see cell to the left). Such protection is anticipated to increase incrementally over the next 30 years. Where cables would be buried deeply enough that protection would not be used, presence of the cable would have no impact on coastal habitats and fauna. |

$CO_2$ = carbon dioxide; EFH = essential fish habitat; EIS = Environmental Impact Statement; EMF = electromagnetic fields; GHG = greenhouse gas; IPF = impact-producing factor; OCS = Outer Continental Shelf

**Table G.1-3: Summary of Activities and the Associated Impact-Producing Factors for Finfish, Invertebrates, and Essential Fish Habitat**

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Accidental releases | Releases of fuels, fluids, and hazardous materials are frequent. Impacts, including mortality, decreased fitness, and contamination of habitat, are localized and temporary, and rarely affect populations.<br><br>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, invertebrates, and EFH depend on many factors, but can be widespread and permanent. | Gradually increasing vessel traffic over the next 30 years would increase the risk of accidental releases. Impacts are unlikely to affect populations. |
| Anchoring and gear utilization | 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, invertebrates, and EFH are greatest for sensitive EFH (e.g., eelgrass, hard bottom) and sessile or slow-moving species (e.g., corals, sponges, and sedentary shellfish). | Impacts from anchoring may occur on a semi-regular 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 benthic species and, possibly, degradation of sensitive habitats. All impacts would be localized; turbidity would be temporary; and impacts from 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 to permanent. |
| Cable emplacement and maintenance | Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances are local, limited to the cable corridor (refer to BOEM 2019a for details). New cables are infrequently added near shore. Cable emplacement and maintenance activities disturb, displace, and injure finfish and invertebrates 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.<br><br>Dredging results in fine sediment deposition. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local, limited to the emplacement corridor. There are also 15 active and 4 inactive/closed dredged material disposal sites within the geographic analysis area (BOEM 2019a). Sediment deposition could have impacts on eggs and larvae, particularly demersal eggs such as longfin squid (*Doryteuthis pealeii*), which are known to have high rates of egg mortality if egg masses are exposed to abrasion or burial. Impacts may vary based on season/time of year. | Future new cables would occasionally disturb the seafloor and cause temporary increases in suspended sediment, resulting in local short-term impacts.<br><br>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. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Climate change | Continuous $CO_2$ emissions causing ocean acidification may contribute to reduced growth or the decline of invertebrates that have calcareous shells over the course of the next 30 years.<br>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 frequencies of various diseases, as well as migration and distributions of finfish, invertebrates, and EFH. This has been shown to affect the distribution of fish in the Northeast, with several species shifting their centers of biomass either northward or to deeper waters (Hare et al. 2016). | No future activities were identified within the geographic analysis area other than ongoing activities. |
| EMF | EMF emanates continuously from installed telecommunication and electrical power transmission cables. Biologically significant impacts on finfish, invertebrates, 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 affects commercially and recreationally important fish species within the southern New England area (CSA Ocean Sciences, Inc. and Exponent 2019). | During operations, future new cables would produce EMF. 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 (MMS 2007). EMF of any two sources would not overlap (even for multiple cables within a single OECC). Although the EMF would exist as long as a cable was in operation, impacts on finfish, invertebrates, and EFH would likely be difficult to detect. |
| Lighting | 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 may also disrupt natural cycles (e.g., spawning), possibly leading to short-term impacts.<br>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 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. 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. |
| Noise | Noise from aircraft reaches the sea surface on a regular basis. However, aircraft noise is not likely to affect finfish, invertebrates, and EFH, as very little of the aircraft noise propagates through the water.<br>Noise from construction occurs frequently in near shores 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.<br>Ongoing site characterization surveys and scientific | Aircraft noise is likely to continue to increase as commercial air traffic increases. However, aircraft noise is not likely to affect finfish, invertebrates, and EFH.<br>Noise from construction near shores is expected to gradually increase in line with human population growth along the coast of the geographic analysis area for this resource.<br>Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | surveys produce noise around sites of investigation. These activities can disturb finfish and invertebrates in the immediate vicinity of the investigation and cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions.<br><br>Some finfish and invertebrates may be able to hear the continuous underwater noise of operational WTGs. As measured at the Block Island Wind Farm, this low frequency noise barely exceeds ambient levels at 164 feet from the WTG base. Based on the results of Thomsen et al. (2015), SPLs would be at or below ambient levels at relatively short distances (approximately 164 feet) from WTG foundations. These low levels of elevated noise likely have little to no impact. Noise is also created by operations and maintenance of marine minerals extraction and commercial fisheries, each of which has minimal and local impacts.<br><br>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 seabed can cause injury and/or mortality to finfish and invertebrates in a small area around each pile and 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 (Weilgart 2018; Hawkins and Popper 2017). 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.<br><br>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.<br><br>While ongoing vessel noise may have some impact on behavior, it is likely limited to brief startle and temporary stress responses. Ongoing activities that contribute to this include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. | anticipated to occur infrequently over the next 30 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise that penetrates deep into the seabed. Site characterization surveys typically use sub-bottom profiler technologies that generate less-intense sound waves, similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize but are likely local and temporary.<br><br>New or expanded marine minerals extraction and commercial fisheries may intermittently increase noise during their operations and maintenance over the next 30 years. Impacts would likely be minimal and local.<br><br>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 30 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. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Port utilization | 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, including dredging. Port utilization is expected to increase over the next 30 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 may continue to increase in the foreseeable future. In addition, the general trend along the coast from Virginia to Maine is that port activity will increase modestly. The ability of ports to receive the increase may require port modifications, leading to local impacts.<br><br>Future channel-deepening activities will likely be undertaken. Existing ports have already affected finfish, invertebrates, 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, impacts on EFH for certain species and/or life stages may lead to impacts on finfish and invertebrates beyond the vicinity of the port. |
| Presence of structures | 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 minimal, localized, and short-term impacts.<br><br>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, invertebrates, and EFH are typically undetectable. Impacts of structures influencing primary productivity and higher trophic levels are possible but are not well understood. New structures are periodically added.<br><br>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 species are attracted to these locations and, thus, benefit on a constant basis (Claisse et al. 2014; Smith et al. 2016); however, the diversity may decline over time as early colonizers are replaced by successional communities dominated by mussels and anemones (Degraer et al. 2019). New surfaces can also be colonized by invasive species (e.g., certain tunicate species) found in hard-bottom habitats on Georges Bank (Frady and Mecray 2004). Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitat to the new hard-structure habitat. 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 | Tall vertical structures can increase seabed scour and sediment suspension. Impacts would likely be highly localized and difficult to detect. Impacts of structures influencing primary productivity and higher trophic levels are possible but are not well understood.<br><br>New cables, installed incrementally in the geographic analysis area for finfish, invertebrates, and EFH over the next 20 to 30 years, would likely require hard protection atop portions of the route (see the cable emplacement and maintenance IPF in this table). The impacts of the presence of these structures described for ongoing activities would continue.<br><br>The infrequent installation of future new structures in the marine environment over the next 30 years may attract finfish and invertebrates that approach the structures during their migrations, which could slow migrations. However, temperature would continue to be a bigger driver of habitat occupation and species movement. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | population-level impacts (Guida et al. 2017; Greene et al. 2010).<br><br>Human structures in the marine environment (e.g., shipwrecks, artificial reefs, and oil platforms) can attract finfish and invertebrates that approach the structures during their migrations, which could slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement than structure (Moser and Shepherd 2009; Fabrizio et al. 2014; Secor et al. 2018). There is no evidence to suggest that structures pose a barrier to migratory animals.<br><br>Regulated fishing effort results in the removal of a substantial amount of the annually produced biomass of commercially regulated finfish and invertebrates and can also influence bycatch of non-regulated species. Ongoing commercial and recreational regulations for finfish and shellfish implemented and enforced by states, municipalities, and/or NOAA, depending on jurisdiction, affect finfish, invertebrates, and EFH by modifying the nature, distribution, and intensity of fishing-related impacts, including those that disturb the seafloor (trawling, dredge fishing). | |

AC = alternating current; BMP = best management practice; BOEM = Bureau of Ocean Energy Management; $CO_2$ = carbon dioxide; DC = direct current; EFH = essential fish habitat; EMF = electromagnetic fields; FCC = Federal Communications Commission; GHG = greenhouse gas; IPF = impact-producing factor; NOAA = National Oceanic and Atmospheric Administration; OCS = Outer Continental Shelf; OECC = offshore export cable corridor; SPL = sound pressure level; WTG = wind turbine generator

### Table G.1-4: Summary of Activities and the Associated Impact-Producing Factors for Marine Mammals

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Accidental releases | Releases of fuel, fluids, and hazardous materials are frequent. Marine mammal exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality or sublethal impacts on the individual fitness, including adrenal impacts, hematological impacts, liver impacts, 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; Takeshita et al. 2017). Additionally, accidental releases may result in impacts on marine mammals due to impacts on prey species.<br><br>Trash and debris may be accidentally discharged through fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation; navigation and traffic; survey activities; cables, lines 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 percent) marine mammal species have been documented ingesting marine litter (Werner et al. 2016). Stranding data indicate potential debris induced | Gradually increasing vessel traffic over the next 30 years would increase the risk of accidental releases of fuel, fluids, hazardous materials, trash, and debris. The impacts described under ongoing activities would continue and increase along with increasing vessel traffic. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | mortality rates of 0 to 22 percent. Mortality has been documented in cases of debris interactions, as well as blockage of the digestive track, disease, injury, and malnutrition (Baulch and Perry 2014). However, it is difficult to link physiological impacts on individuals to population-level impacts (Browne et al. 2015). | |
| Cable emplacement and maintenance | Cable maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances will 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 gray seals (*Halichoerus grypus*) 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 gray 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 may result in temporary and short-term impacts on marine mammal prey species. | The FCC has two pending submarine telecommunication cable application in the North Atlantic. The impact on water quality from sediment suspension during cable emplacement would be 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 impacts would be temporary and short term. |
| Climate change | Increased storm frequency could result in increased energetic costs for marine mammals and reduced fitness, particularly for juveniles, calves, and pups.<br><br>Ocean acidification has the potential to lead to long-term and high-consequence impacts on marine ecosystems by contributing to reduced growth or the decline of invertebrates that have calcareous shells.<br><br>Altered habitat/ecology has the potential to lead to long-term and high-consequence impacts on marine mammals as a result of changes in distribution, reduced breeding, and/or foraging habitat availability, and disruptions in migration.<br><br>Altered migration patterns have the potential to lead to long-term and high-consequence impacts on marine mammals. For example, the NARW (*Eubalaena glacialis*) appears to be migrating differently and feeding in different areas in response to changes in prey densities related to climate change (Record et al. 2019; MacLeod 2009; Nunny and Simmonds 2019.)<br><br>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 influencing | No future activities were identified within the geographic analysis area other than ongoing activities. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | 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 potentially 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).<br><br>Increased erosion could impact seal haul outs, reducing their habitat availability, especially as things like sea walls are added, blocking seals access to shore. | |
| EMF | EMF emanate constantly from installed telecommunication and electrical power transmission cables. In the marine mammal geographic analysis area, there are six existing power cables connecting Martha's Vineyard and Nantucket to the mainland. Marine mammals appear to have a detection threshold for magnetic intensity gradients (i.e., changes in magnetic field levels with distance) of 0.1 percent 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 EMF. Depending on the magnitude and persistence of the confounding magnetic field, such an impact could cause a trivial temporary change in swim direction or a longer detour during the animal's migration (Gill et al. 2005). Such an impact on marine mammals is more likely to occur with DC cables than with AC cables (Normandeau 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 operations, 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 burial depth to reduce potential EMF to low levels (MMS 2007). 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 impacts from the numerous submarine cables have been observed. Further, EMF would be limited to extremely small portions of the areas used by migrating marine mammals. As such, exposure to EMF would be low; as a result, impacts on marine mammals would not be expected. |
| Noise | 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 may respond with behavioral changes, 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 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. | Future low altitude aircraft activities such as survey activities and U.S. 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 may respond with behavior changes, 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.<br><br>Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 30 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise that penetrates deep into the seabed. Site |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | 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 impacts, 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).<br><br>Marine mammals would be able to hear the continuous underwater noise of operational WTGs. As measured at the Block Island Wind Facility, this low frequency noise barely exceeds ambient levels at 164 feet from the WTG base. Based on the results of Thomsen et al. (2015) and Kraus et al. (2016), SPLs would be at or below ambient levels at relatively short distances from the WTG foundations.<br><br>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 seabed 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 may affect marine mammals during foraging, orientation, migration, predator detection, social interactions, or other activities (Southall et al. 2007). Noise exposure associated 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 will be conducted in accordance with a Project-specific IHA to minimize impacts on marine mammals.<br><br>Ongoing activities that contribute to vessel noise include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels, as well as 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 may have some impact on marine mammal behavior, it would be limited to brief | characterization surveys typically use sub-bottom profiler technologies that generate less-intense sound waves similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize but are likely local and temporary.<br><br>Cable-laying impacts resulting from future non-offshore wind activities would be identical to those described for future offshore wind projects.<br><br>Any offshore projects that require the use of ocean vessels could potentially 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, these brief responses of individuals to passing vessels would be unlikely given the patchy distribution of marine mammals, and no stock or population-level impacts would be expected. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | 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 of the vessel by 26 percent (Jensen et al. 2009). Pilot whales, in a quieter, deep-water habitat, could experience a 50 percent reduction in communication range from a similar size boat and speed (Jensen et al. 2009). Since lower frequencies propagate farther from the sound source compared to higher frequencies, low frequency cetaceans are at a greater risk of experiencing harassment from vessel traffic. | |
| Port utilization | 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. Port expansion activities are localized to nearshore habitats and are expected to result in temporary and short-term impacts, if any, on marine mammals. Vessel noise may affect marine mammals, but the response would be temporary and short term. The impacts on water quality (and, thus, on marine mammals) from sediment suspension during port expansion activities is temporary, short term, and would be similar to those described under the cable emplacement and maintenance IPF in this table. | 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 will increase modestly. The ability of ports to receive the increase in larger ships will 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 (and, thus, on increases in suspended sediments and the potential for accidental discharges). The increased sediment suspension could be long term, depending on the vessel traffic increase. However, the existing suspended sediment concentrations in Nantucket Sound are already 45-71 mg/L, which is fairly high. Impacts from vessel traffic are likely to be masked by the natural variability. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future. Additional impacts associated with the increased risk of vessel strike could also occur. |
| Presence of structures | There are more than 130 artificial reefs in the Mid-Atlantic region. Entanglement or ingestion of lost fishing gear may result in long-term and high-intensity impacts, but with low exposure due to localized and geographic spacing of artificial reefs, long term. Currently, bridge foundations and the Block Island Wind Facility may be considered artificial reefs and may 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 near shore where these structures are located. There are very few, if any, areas within the geographic analysis area for marine mammals that would serve to concentrate recreational | The presence of structures associated with non-offshore wind development in nearshore coastal waters have the potential to provide habitat for seals and small odontocetes, as well as preferred prey species. Bridge foundations will 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 (Taormina et al. 2018; Causon and Gill 2018). The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | fishing and increase the likelihood that marine mammals would encounter lost fishing gear.<br><br>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 Block Inland Wind Facility WTGs) in a soft-bottom habitat can create artificial reefs, thus inducing the reef effect (Taormina et al. 2018; NMFS 2015). 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.<br><br>No ongoing activities in the marine mammal geographic analysis area beyond offshore wind facilities are measurably contributing to avoidance/displacement, behavior disruption related to breeding and migration, or displacement into higher risk areas. There may be some impacts resulting from the existing Block Island Wind Facility but given that there are only five WTGs, no measurable impacts are occurring. | (Taormina et al. 2018), providing a potential increase in available forage items and shelter for marine mammals compared to the surrounding soft bottoms. This reef effect has the potential to result in long-term and low-intensity beneficial impacts. |
| Traffic | Current activities that are contributing to vessel traffic 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 percent 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, and 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 impacts on most species unlikely (U.S. Navy 2018). However, some species of baleen whales that spend considerable time at the surface, including NARW, are more susceptible to vessel strike. Vessel strike is a primary cause of NARW mortality, and vessel strikes associated with future non-offshore wind activities have some potential for stock or population-level impacts on the species. |

µT = microtesla; AC = alternating current; BOEM = Bureau of Ocean Energy Management; DC = direct current; EMF = electromagnetic fields; ESP = electrical service platform; FCC = Federal Communications Commission; GHG = greenhouse gas; IHA = Incidental Harassment Authorization; IPF = impact-producing factor; mg/L = milligrams per liter; NARW = North Atlantic right whale; OCS = Outer Continental Shelf; PTS = permanent threshold shift; SPL = sound pressure level; TTS = temporary threshold shift; WTG = wind turbine generator

**Table G.1-5: Summary of Activities and the Associated Impact-Producing Factors for Sea Turtles**

| Associated IPF | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Accidental releases | Releases of fuel, fluids, and hazardous materials occur frequently. Sea turtle exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality (Shigenaka et al. 2010) or sublethal impacts on individual fitness, including adrenal impacts, dehydration, hematological impacts, increased disease incidence, liver impacts, poor body condition, skin impacts, skeletomuscular impacts, and several other health impacts 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 may result in impacts on sea turtles due to impacts on prey species.<br><br>Trash and debris may be accidentally discharged through fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation; navigation and traffic; survey activities; cables, lines, 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 has also been documented (Tomás et al. 2002). Ingestion can also occur when individuals mistake debris for potential prey items (Gregory 2009; Hoarau et al. 2014; Tomás 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 impacts more difficult to detect (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). Long-term sublethal impacts may 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 impacts are cryptic, and clear causal links are difficult to identify (Nelms et al. 2016). | Gradually increasing vessel traffic over the next 30 years would increase the risk of accidental releases of fuel, fluids, hazardous materials, trash, and debris, as well as the associated impacts described for ongoing activities. |
| Cable emplacement and maintenance | Cable maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances will be local and generally limited to the emplacement corridor. Data are not available regarding impacts of suspended sediments on adult and juvenile sea turtles, although elevated suspended sediments may cause individuals to alter normal movements and behaviors. However, these changes are expected to be too small to be detected (BOEM 2022a). 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 (BOEM 2022a). Turbidity | The FCC has two pending submarine telecommunication cable applications in the North Atlantic. 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. Any impacts would be short term and temporary. Turbidity associated with increased sedimentation may result in short-term and temporary impacts on some sea turtle prey species. |

| Associated IPF | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | associated with increased sedimentation may result in short-term and temporary impacts on sea turtle prey species. | |
| Climate change | Increased storm frequency could lead to long-term and high-consequence impacts on sea turtle onshore beach nesting habitat, including changes to nesting periods, changes in sex ratios of nestlings, drowned nests, and loss or degradation of nesting beaches. Offshore impacts, including sedimentation of nearshore hard-bottom habitats, have the potential to result in long-term and high-consequence changes to foraging habitat availability for green turtles (*Chelonia mydas*).<br>Ocean acidification has the potential to lead to long-term and high-consequence impacts on marine ecosystems by contributing to reduced growth or the decline of invertebrates that have calcareous shells.<br>Altered habitat/ecology has the potential to lead to long-term and high-consequence impacts on sea turtles by influencing distributions of sea turtles and/or prey resources, as well as sea turtle breeding, foraging, and sheltering habitat use.<br>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. Climate change can also lead to long-term and high-consequence impacts on sea turtle habitat use and migratory patterns.<br>The proliferation of coastline protections has the potential to result in long-term and high-consequence impacts on sea turtle nesting by eliminating or precluding access to potentially suitable nesting habitat or access to potentially suitable habitat.<br>Sediment erosion and/or deposition in coastal waters have the potential to result in long-term and 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 other than ongoing activities. |
| EMF | EMF emanate constantly from installed telecommunication and electrical power transmission cables. In the geographic analysis area, there are six existing power cables connecting Martha's Vineyard and Nantucket to the mainland. Sea turtles appear to have a detection threshold of magnetosensitivity and behavioral responses to field intensities ranging from 0.0047 to 4,000 μT for loggerhead turtles (*Caretta caretta*), 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 may be able to detect magnetic fields while they are foraging on the bottom near the cables and potentially up to 82 feet in the water column above the cable. Juvenile and adult sea | 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 (MMS 2007). 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, EMF would be limited to extremely small portions of the areas used by resident or migrating sea turtles. As such, exposure to |

| Associated IPF | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | turtles may 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 sea turtle impacts from EMF generated by underwater cables, although 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). | EMF would be low; as a result, impacts on sea turtles would not be expected. |
| Lighting | Ocean vessel, such as ongoing commercial vessel traffic, recreational and fishing activity, and scientific and academic research, traffic have an array of lights including navigational, deck lights, 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.<br><br>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 impact. Decades of oil and gas platform operation in the Gulf of Mexico, with considerably more lighting than offshore WTGs, has not resulted in any known impacts on sea turtles (BOEM 2022a). | 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.<br><br>Non-offshore wind activities would not be expected to appreciably contribute to structure lighting. As such, no impact on sea turtles would be expected. |
| Noise | 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 may 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.<br><br>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 leatherback sea turtles (*Dermochelys coriacea*) and possibly loggerhead sea turtles, if present within the ensonified area (NSF and USGS 2011). The potential for PTS and TTS is considered possible in proximity to G&G surveys, 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. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise that penetrates deep into the seabed. Site characterization surveys typically use sub-bottom profiler technologies that generate less-intense sound waves similar to common deep-water echosounders. The intensity and extent of the resulting | Future low altitude aircraft activities such as survey activities and U.S. Navy training operations could result in short-term responses of sea turtles to aircraft noise, similar to those described for ongoing activities.<br><br>Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 30 years. Impacts of these activities would be similar to those described for ongoing activities.<br><br>Cable-laying impacts resulting from future non-offshore wind activities would be identical to those described for future offshore wind projects (EIS Section 3.8, Sea Turtles).<br><br>Any offshore projects that require the use of ocean vessels could potentially 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, these brief responses of individuals to passing vessels would be unlikely given the patchy distribution of sea turtles, and no stock or population-level impacts would be expected. |

| Associated IPF | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | impacts are difficult to generalize but are likely local and temporary<br><br>Sea turtles would be able to hear the continuous underwater noise of operational WTGs. As measured at the Block Island Wind Facility, this low frequency noise barely exceeds ambient levels at 164 feet from the WTG base (Miller and Potty 2017). Based on the results of Thomsen et al. (2015) and Kraus et al. (2016), SPLs would be at or below ambient levels at relatively short distances from the WTG foundations. Furthermore, no information suggests that such noise would affect turtles.<br><br>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 seabed 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. BOEM and NMFS have adopted the following thresholds based on current literature:<br><br>• Potential mortal injury: 210 dB cumulative SPL or greater than 207 dB peak SPL (Popper et al. 2014)<br>• Behavioral disturbance: 166 dB referenced to 1 μPa RMS<br><br>The frequency range for vessel noise (10 to 1,000 Hz; MMS 2007) overlaps with sea turtles' known hearing range (less than 1,000 Hz with maximum sensitivity between 200 to 700 Hz; Bartol 1999) and would, therefore, be audible. However, Hazel et al. (2007) suggested that sea turtles' ability to detect approaching vessels is primarily vision-dependent, not acoustic. Sea turtles may 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 affect sea turtle behavior, especially their submergence patterns. | |
| Port utilization | 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. Port expansion activities are localized to nearshore habitats and are expected to result in short-term and temporary impacts, if any, on sea turtles. Vessel noise may affect sea turtles, but response would likely be short term and temporary. The impact on water quality from sediment suspension during port expansion activities is short term and temporary and would be similar to those described under the cable emplacement and maintenance IPF in this table. | 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 will increase modestly. The ability of ports to receive the increase in larger ships will 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 |

| Associated IPF | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | | suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long term depending on the vessel traffic increase. However, the existing suspended sediment concentrations in Nantucket Sound are already 45 to 71 mg/L, which is fairly high. Impacts from vessel traffic are likely to be masked by the natural variability. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future. Additional impacts associated with the increased risk of vessel strikes could also occur. |
| Presence of structures | The Mid-Atlantic region has more than 130 artificial reefs. Entanglement or ingestion of lost fishing gear may result in long-term and high-intensity impacts, but with low exposure due to localized and geographic spacing of artificial reefs. Currently, bridge foundations and the Block Island Wind Facility may be considered artificial reefs and may 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 near shore, where these structures are located. There are very few, if any, areas in the geographic analysis area for sea turtles that would serve to concentrate recreational fishing and increase the likelihood that sea turtles would encounter lost fishing gear.<br><br>The Mid-Atlantic region has more than 130 artificial reefs. Hard-bottom (scour control and rock mattresses) and vertical structures (bridge foundations and Block Inland Wind Facility WTGs) in a soft-bottom habitat can create artificial reefs, thus inducing the reef effect (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.<br><br>No ongoing activities in the geographic analysis area for sea turtles beyond offshore wind facilities are measurably contributing to avoidance/displacement. There may be some impacts resulting from the existing Block Island Wind Facility, but given that there are only five WTGs, no measurable impacts are occurring.<br><br>No ongoing activities in the geographic analysis area for sea turtles beyond offshore wind facilities are measurably contributing to behavioral disruption related to breeding and migration or displacement into higher risk areas. | 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 and low-intensity beneficial impacts. Bridge foundations will continue to provide foraging opportunities for sea turtles with measurable benefits to some individuals. |
| Traffic | Current activities contributing to vessel collisions include port traffic levels, fairways, traffic separation schemes, commercial vessel traffic, recreational and fishing | Vessel traffic associated with non-offshore wind development has the potential to result in an increased collision risk. Sea turtles are most |

| Associated IPF | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | 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 coast 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 percent in the 1980s to a record high of 20.5 percent 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 may exceed 10 knots in such waters, and those vessels traveling at greater than 10 knots would pose the greatest threat to sea turtles. | susceptible to vessel collisions in coastal waters, where they forage from May through November. Vessel speed may exceed 10 knots in such waters, and those vessels traveling at greater than 10 knots would pose the greatest threat to sea turtles. |

μT = microtesla; AC = alternating current; BOEM = Bureau of Ocean Energy Management; dB = decibel; EIS = Environmental Impact Statement; EMF = electromagnetic fields; FCC = Federal Communications Commission; G&G = geological and geophysical; GHG = greenhouse gas; Hz = hertz; IPF = impact-producing factor; mg/L = milligrams per liter; NMFS = National Marine Fisheries Service; OCS = Outer Continental Shelf; PTS = permanent threshold shift; RMS = root mean squared; SPL = sound pressure level; TTS = temporary threshold shift; WTG = wind turbine generator

**Table G.1-6: Summary of Activities and the Associated Impact-Producing Factors for Commercial Fisheries and For-Hire Recreational Fishing**

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Anchoring and gear utilization | Impacts from anchoring occur due to ongoing military, survey, commercial, and recreational activities. The short-term and localized impact on this resource is the presence of a navigational hazard (anchored vessel) to fishing vessels. | Impacts from anchoring may occur on a semi-regular basis over the next 30 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 hundreds of feet of anchored vessel) navigational hazard to fishing vessels. |
| Cable emplacement and maintenance | 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. In the geographic analysis area for this resource, there are six existing power cables (BOEM 2019a). | Future cable emplacement and maintenance, perhaps connecting Martha's Vineyard and/or Nantucket to the mainland, would occasionally disturb the seafloor and cause temporary displacement in fishing vessels and increases in suspended sediment resulting in local and 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 disruption of fishing activities would be expected. |
| Climate change | Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters, influencing the distributions of species important for commercial and for-hire recreational fisheries. If the distribution of important fish stocks changes, it could affect where commercial and for-hire recreational fisheries are located and potentially increase the cost of fishing if transiting time increases. Continuous $CO_2$ emissions causing ocean | No future activities were identified within the geographic analysis area other than ongoing activities. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | acidification may contribute to reduced growth, or the decline of, invertebrates that have calcareous shells over the course of the next 30 years. Over time, this could potentially directly affect species that are important for commercial and for-hire recreational fisheries or their prey species. | |
| Noise | 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.<br><br>Noise is also created by operations and maintenance of marine minerals extraction, which has minimal and local impacts on fish but likely no impacts at a fishery level.<br><br>Ongoing site characterization surveys and scientific surveys produce noise around investigation sites. These activities can disturb fish and invertebrates in the immediate vicinity of the investigation and cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions.<br><br>Noise from pile driving occurs periodically in nearshore areas when ports or marinas, piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or the seabed can cause injury and/or mortality to finfish and invertebrates in a small area around each pile and 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.<br><br>Vessel noise is anticipated to continue at levels similar to current levels. While vessel noise may have some impact on behavior, it is likely limited to brief startle and temporary stress responses. Ongoing activities that contribute to vessel noise include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels (EIS Section 3.10, Commercial Fisheries and For-Hire Recreational Fishing). | Noise from nearshore construction 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 may increase noise during operations and maintenance over the next 30 years. Impacts from construction, operations, and maintenance would likely be minimal 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 physical disturbance and sediment suspension. Therefore, fishery-level impacts are unlikely.<br><br>Site characterization surveys and scientific surveys are anticipated to occur infrequently over the next 30 years. Site characterization surveys typically use sub-bottom profiler technologies that generate sound waves similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize but are likely local and temporary.<br><br>Planned new barge route and dredging disposal sites would generate vessel noise when implemented (EIS Section 3.10). |
| Port utilization | 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, including dredging. Port utilization is expected to increase over the next 30 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 30 years, with increased activity during construction. The ability of ports to receive the increase in vessel traffic may require port modifications, such |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | | as channel deepening, leading to local impacts on fish populations.<br><br>Port expansions could also increase vessel traffic and competition for dockside services, which could affect fishing vessels. |
| Presence of structures | Structures within and near the cumulative lease areas that pose potential navigation hazards include the Block Island Wind Farm WTGs, 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.<br><br>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 minimal, localized, short-term impacts on fish but likely no impacts at a fishery level.<br><br>Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon vertical relief in a mostly sandy seascape. A large portion is homogeneous sandy seascape, but there is some hard and/or complex habitat. Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitat 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 may be considered adverse, beneficial, or neither. Commercial and for-hire recreational fishing can occur near these structures. For-hire recreational fishing is more popular, as commercial mobile fishing gear risk snagging on the structures.<br><br>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 (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. Current structures do not result in space use conflicts.<br><br>The existing offshore cable infrastructure supports the economy by transmitting electric power and communications between mainland and islands. Two subsea cables cross the far western portion of OCS-A | No known planned 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.<br><br>New cables, installed incrementally in the geographic analysis area over the next 20 to 30 years, would likely require hard protection atop portions of the route (see cable emplacement and maintenance IPF in this table). Any new towers, buoys, or piers would also create uncommon vertical 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 may 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 may be long term.<br><br>The infrequent installation of future new structures in the marine environment over the next 30 years may 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 (Fabrizio et al. 2014; Moser and Shepherd 2009; Secor et al. 2018). Migratory animals would likely be able to proceed from structures unimpeded. Therefore, fishery-level impacts are not anticipated.<br><br>Planned fishery management actions include measures to reduce the risk of interactions between fishing gear and the NARW by 60 percent (McCreary and Brooks 2019). This would likely have a significant impact on fishing effort in the lobster and Jonah crab (*Cancer borealis)* fisheries in the geographic analysis area for this resource. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | 0487. These cables are associated with a larger network of subsea cables that make landfall near Charlestown, Massachusetts. These cables are near the Block Island Wind Farm and cross the Block Island Wind Farm export cable. Shoreline developments are ongoing and include docks, ports, and other commercial, industrial, and residential structures.<br><br>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. | |
| Traffic | 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 may result in occasional collisions. Vessels need to navigate around structures to avoid allisions. When multiple vessels need to navigate around a structure, navigation is more complex, as the vessels need to avoid both the structure and each other. The risk for collisions is ongoing but infrequent. | 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. |

BOEM = Bureau of Ocean Energy Management; $CO_2$ = carbon dioxide; EIS = Environmental Impact Statement; FCC = Federal Communications Commission; FMP = Fisheries Management Plan; GHG = greenhouse gas; IPF = impact-producing factor; NARW = North Atlantic right whale; NOAA = National Oceanic and Atmospheric Administration; WTG = wind turbine generator

### Table G.1-7: Summary of Activities and the Associated Impact-Producing Factors for Cultural Resources

| Associated IPF | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Accidental releases | Accidental releases of fuel, fluids, hazardous materials, trash, and debris 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.<br><br>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 archaeological resources. In addition, the presence of large amounts of trash on shorelines or the ocean surface can impact the | Gradually increasing vessel traffic over the next 30 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 minimal, 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 |

| Associated IPF | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | cultural value of TCPs for stakeholders. State and federal laws 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 impacts of small-scale accidental releases of trash. | 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.<br><br>Future activities with the potential to result in accidental releases include 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. |
| Anchoring and gear utilization | The use of vessel anchoring and gear (i.e., wire ropes, cables, chain, and sweep on the seafloor) that disturbs the seafloor, such as bottom trawls and anchors, by military, recreational, industrial, and commercial vessels can affect cultural resources by physically damaging maritime archaeological resources such as shipwrecks and debris fields. | Future activities with the potential to result in anchoring/gear utilization include 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. |
| Cable emplacement and maintenance | Current offshore construction activity is limited to subsea fiber optic and electrical transmission cables, including six existing power cables in the geographic analysis area.<br><br>Activities associated with dredge operations and activities could damage marine archaeological resources. Ongoing activities identified by BOEM with the potential to result in dredging impacts include construction and operations 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; marine transportation; fisheries use and management; and oil and gas activities. | Future activities with the potential to result in seafloor disturbances similar to offshore impacts include construction and operations 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 archaeological resources including shipwrecks and formerly subaerially exposed pre-contact Native American archaeological sites.<br><br>Dredging activities would gradually increase through time as new offshore infrastructure is built, such as gas pipelines and electrical lines, and as ports and harbors are expanded or maintained. |
| Climate change | Sea level rise and increased storm severity and frequency would result in impacts on archaeological, historic structural, and TCP resources. Increased storm frequency and severity would also result in damage to and/or destruction of historic structures. Sea level rise would increase erosion-related impacts on archaeological and historic structural resources, while sea level rise would inundate archaeological, historic structural, and TCP resources.<br><br>Altered habitat/ecology and 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, shell fishing, and fowling activities. | Sea level rise and storm severity/frequency would increase due to the impacts of climate change. The rate of change to habitats/ecology, migratory animal patterns, and property and infrastructure damage would increase as a result of climate change. Climate change would necessitate increased installation of coastal protective measures. |

| Associated IPF | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | Sea level rise and increased storm severity and frequency would result in impacts on archaeological, historic structural, and TCP resources. Increased storm frequency and severity would result in damage to and/or destruction of historic structures. Sea level rise would increase erosion-related impacts on archaeological and historic structural resources, while sea level rise would inundate archaeological, historical structure, and TCP resources.<br><br>Installation of protective measures such as barriers and sea walls would impact archaeological 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.<br><br>Sea level rise and increased storm severity and frequency would result in impacts on archaeological, historical structure, and TCP resources. Increased storm frequency and severity would result in damage to and/or destruction of historic structures. Sea level rise would increase erosion-related impacts on archaeological and historic structure resources, while sea level rise would inundate archaeological, historic structure, and TCP resources. | |
| Land disturbance | Onshore construction activities can impact archaeological resources by damaging and/or removing resources. | Future activities that could result in terrestrial land disturbance impacts include onshore residential, commercial, industrial, and military development activities in central Cape Cod, particularly those proximate to OECRs and interconnection facilities. Onshore construction would continue at current rates. |
| Lighting | 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 southern shores of Martha's Vineyard, Nantucket, and possibly portions of Cape Cod, for which a nighttime sky is a contributing element to historical integrity. This excludes resources that are closed to stakeholders 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.<br><br>Construction of new structures that introduce new light sources into the setting of historic standing structures 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 (e.g., commercial building, radio antenna, large satellite dishes) requiring nighttime | Future activities with the potential to result in vessel lighting impacts include construction and operations 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.<br><br>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. |

| Associated IPF | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | hazard lighting to prevent aircraft collision can cause these types of impacts. | |
| Port utilization | 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 MCT was upgraded by the Port of New Bedford specifically to support the construction of offshore wind facilities. Expansion of port facilities can introduce large, modern port infrastructure into the viewsheds of nearby historic properties, impacting their setting and historical significance. | Future activities with the potential to result in port expansion impacts include 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; marine transportation; fisheries use and management; and oil and gas activities. Port expansion would continue at current levels, which reflect efforts to capture business associated with the offshore wind industry (irrespective of specific projects). |
| 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 meteorological towers. Marine activity would also occur within the marine viewshed of the geographic analysis area. |

BOEM = Bureau of Ocean Energy Management; IPF = impact-producing factor; MCT = Marine Commerce Terminal; OECR = onshore export cable route; TCP = traditional cultural property

**Table G.1-8: Summary of Activities and the Associated Impact-Producing Factors for Demographics, Employment, and Economics**

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Cable emplacement and 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, perhaps including those connecting Martha's Vineyard and/or Nantucket to the mainland, would disturb the seafloor and cause temporary increases in suspended sediment resulting in infrequent, localized, short-term impacts over the next 30 years. |
| Climate change | Climate models predict climate change if current trends continue. Climate change has implications for demographics and 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.<br><br>In 2018, Massachusetts energy production totaled 125.2 trillion Btu, of which 72.4 trillion Btu were from renewable sources, including geothermal, hydroelectric, wind, solar, and biomass (U.S. Energy Information Administration 2019). | 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.<br><br>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. |
| Land disturbance | Onshore development activities support local population growth, employment, and economies. Disturbances can cause temporary, localized traffic delays and restricted access to adjacent properties. The | Onshore development projects would be ongoing in accordance with local government land use plans and regulations. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | rate of onshore land disturbance is expected to continue at or near current rates. | |
| Lighting | Offshore buoys and towers emit low-intensity light, while onshore structures, including houses and ports, emit substantially more light on an ongoing basis.<br>Ocean vessels have an array of lights including navigational lights and deck lights. | 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.<br>Anticipated modest growth in vessel traffic would result in some growth in the nighttime traffic of vessels with lighting. |
| Noise | 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.<br>Infrequent trenching for pipeline and cable-laying activities emit 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.<br>Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to vessel noise include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels. | Periodic trenching would be needed over the next 30 years for repair or installation of underground infrastructure.<br>Planned new barge route and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain. |
| Port utilization | 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 MCT at the Port of New Bedford, among other ports in the geographic analysis area, was upgraded by the port specifically to support the construction of offshore wind energy facilities. As ports expand, maintenance dredging of shipping channels is expected to increase. | Ports would need to perform maintenance and upgrade facilities over the next 30 years to ensure that they can still receive the projected future volume of vessels visiting their ports and are able to host larger deep draft vessels as they continue to increase in size. |
| Presence of structures | 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.<br>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 costs for gear owners and are expected to continue at or near current levels.<br>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 may be known as FADs. Recreational and commercial fishing can occur | Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | near the FADs, although recreational fishing is more popular because commercial mobile fishing gear is more likely to snag on FADs.<br><br>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, as vessels need to avoid both the structure and each other. Current structures do not result in space use conflicts.<br><br>No existing offshore structures are within the viewshed of the SWDA except buoys.<br><br>The existing offshore cable infrastructure supports the economy by transmitting electric power and communications between mainland and islands. Additional communication cables run between the U.S. East Coast and European countries along the eastern Atlantic. | |
| Traffic | Ports and marine traffic related to shipping, fishing, and recreation in the geographic analysis area are important to the region’s economy. No substantial changes are anticipated to existing vessel traffic volumes.<br><br>The region’s substantial marine traffic may 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. | New vessel traffic near the geographic analysis area would be generated by proposed barge routes and dredging demolition sites over the next 30 years. Marine commerce and related industries would continue to be important to the geographic analysis area economy. No substantial changes anticipated. |

Btu = British thermal unit; FAD = fish aggregating device; FCC = Federal Communications Commission; IPF = impact-producing factor; MCT = Marine Commerce Terminal; SWDA = Southern Wind Development Area

### Table G.1-9: Summary of Activities and the Associated Impact-Producing Factors for Environmental Justice

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Air emissions | Ongoing population growth and new development within the geographic analysis area is likely to increase traffic with resulting increase in emissions from motor vehicles. Some new industrial development may 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 may include emissions-producing industry and new development that would increase emissions from motor vehicles. Some historically industrial waterfront locations will 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 re-use industrial space. |
| Cable emplacement and 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. Six existing power cables are in the geographic analysis area. Refer to EIS Appendix A, Required Environmental Permits and Consultations, for details. | The FCC has two pending submarine telecommunication cable applications in the North Atlantic. Future new cables, perhaps including those connecting Martha’s Vineyard and/or Nantucket to the mainland, would disturb the seafloor and cause temporary increases in suspended sediment, resulting in infrequent, localized, short-term impacts over the next 30 years. |

| **Associated IPFs** | **Ongoing Activities** | **Future Non-Offshore Wind Activities Intensity/Extent** |
|---|---|---|
| Land disturbance | Potential erosion and sedimentation from development and construction is controlled by local and state development regulations.<br>Onshore development supports local population growth, employment, and economics.<br>Onshore development would result in changes in land use in accordance with local government land use plans and regulations. | New development activities would be subject to erosion and sedimentation regulations.<br>Onshore development would continue in accordance with local government land use plans and regulations.<br>Development of onshore solar and wind energy would provide diversified, small-scale energy generation. |
| Lighting | 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. |
| Noise | Offshore operations and maintenance of existing wind energy projects generates negligible amounts of noise.<br>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.<br>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.<br>Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to vessel noise include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels. | Periodic trenching would be needed over the next 30 years for repair or installation of underground infrastructure.<br>Planned new barge route and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain. |
| Port utilization | 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 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 are able to host larger deep draft vessels as they continue to increase in size. |
| Presence of structures | 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 costs for gear owners and are expected to continue at or near current levels.<br>Vessels need to navigate around structures to avoid collisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure, as vessels need to avoid both the structure and each other.<br>Current structures do not result in space use conflicts. There are no existing offshore structures within the viewshed of the SWDA except buoys. | Vessel traffic is generally not expected to meaningfully increase over the next 30 years. The presence of navigation hazards is expected to continue at or near current levels.<br>Existing cable operations and maintenance activities would continue within and offshore from the geographic analysis area. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | Two subsea cables cross the far western portion of OCS-A 0487. These cables are associated with a larger network of subsea cables south of the lease areas and make landfall near Charlestown, Massachusetts. These cables are located near the Block Island Wind Farm and cross the Block Island Wind Farm export cable. | |
| Traffic | Ports and marine traffic related to shipping, fishing, and recreation in the geographic analysis area 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 30 years. Marine commerce and related industries would continue to be important to the geographic analysis area employment. |

EIS = Environmental Impact Statement; FCC = Federal Communications Commission; IPF = impact-producing factor; MCT = Marine Commerce Terminal; SWDA = Southern Wind Development Area

**Table G.1-10: Summary of Activities and the Associated Impact-Producing Factors for Navigation and Vessel Traffic**

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Anchoring and gear utilization | Larger commercial vessels (specifically tankers) sometimes anchor outside 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 and vessel traffic in the immediate anchorage area. All vessels may anchor if they lose power to prevent them from drifting and creating navigational hazards for other vessels or for drifting into structures. | Lightering and anchoring operations are expected to continue at or near current levels, with the expectation of moderate increase commensurate with any increase in tankers visiting ports. Deep draft visits to major ports are also expected to increase, expanding the potential for an individual vessel to lose power and need to anchor, creating navigational hazards for other vessels or for drifting into structures. Recreational activity and commercial fishing activity would likely stay the same related to anchoring. |
| Cable emplacement and maintenance | Within the geographic analysis area for navigation and vessel traffic, existing cables may require access for maintenance activities. Infrequent cable maintenance activities may cause temporary increases in vessel traffic and navigational complexity. Six existing power cables are currently in the geographic analysis area for navigation and vessel traffic. | The FCC has two pending submarine telecommunication cable applications in the North Atlantic. Future new cables, perhaps including those connecting Martha's Vineyard and/or Nantucket to the mainland, would cause temporary increases in vessel traffic during construction or operations, resulting in infrequent, localized, short-term impacts over the next 30 years. Care would need to be taken by vessels that are crossing the cable routes during these activities. |
| Port utilization | 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. 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. | Ports would need to perform maintenance and perform upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and are 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. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Presence of structures | 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.<br>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 near artificial reefs as commercial mobile fishing gear can risk snagging on the artificial reef structure.<br>Equipment in the ocean can create a substrate for mollusks to attach to, and fish eggs to settle nearby. This can create a reef-like habitat and benefit structure-oriented species on a constant basis.<br>Noise-producing activities, such as pile driving and vessel traffic, may interfere and affect marine mammals during foraging, orientation, migration, response to predators, social interactions, or other activities. Marine mammals may also be sensitive to changes in magnetic field levels. The presence of structures and operation noise could cause mammals to avoid areas.<br>Vessels need to navigate around structures to avoid allisions. When multiple vessels need to navigate around a structure, navigation is made more complex, as the vessels need to avoid both the structure and each other.<br>Currently, the offshore area is occupied by marine trade, stationary and mobile fishing, and survey activities. Some deep draft and tug/towing vessels transit between the Narragansett/Buzzards Bay traffic separation scheme precautionary area and points north/east by way of the Nantucket-Ambrose Fairway and can cross through the southern portion of the RI/MA Lease Areas, particularly through OCS-A 0500 and 0501. | 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. Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.<br>Fishing near artificial reefs is not expected to change meaningfully over the next 30 years.<br>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. The presence of navigation hazards is expected to continue at or near current levels. |
| Traffic | Current vessel traffic includes commercial and other activity concentrated in designated navigation corridors, as well as commercial and recreational fishing activity, USCG maritime SAR, military vessel activity, and scientific and academic vessel traffic.<br>The likelihood of collisions, allisions, and other incidents is expected to continue at or near current rates. No substantial changes are anticipated to existing air and vessel traffic volumes. | New vessel traffic, along with collisions, allisions, and other incidents in the geographic analysis area would be generated by increased overall commercial, SAR, and other vessel activity, as well as proposed barge routes and dredging demolition sites over the next 30 years. |

BOEM = Bureau of Ocean Energy Management; FCC = Federal Communications Commission; IPF = impact-producing factor; RI/MA Lease Areas = Rhode Island and Massachusetts Lease Areas; SAR = search and rescue; USCG = U.S. Coast Guard

**Table G.1-11: Summary of Activities and the Associated Impact-Producing Factors for Other Uses**

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Presence of structures | Existing stationary facilities within the geographic analysis area that present navigational hazards, including allision risks, include the five WTGs in the Block Island Wind Farm, onshore wind turbines, communication towers, dock facilities, and other onshore and offshore commercial, industrial, and residential structures. The Block Island Wind Farm WTGs also support fish aggregation.<br><br>Eight existing submarine cables are in the geographic analysis area, including submarine power cables between the mainland and Nantucket and Martha's Vineyard, as well as two cables that cross the far western side of OCS-A 0487. | Onshore, development activities are anticipated to continue with additional proposed communications towers and onshore commercial, industrial, and residential developments.<br><br>Submarine cables would remain in current locations with infrequent maintenance continuing along those cable routes for the foreseeable future. |
| Traffic | Existing air traffic include commercial aviation, general aviation, USCG SAR activity, military training, and aircraft used for scientific and academic surveys in marine environments.<br><br>Current vessel traffic includes commercial and other activity concentrated in designated navigation corridors, as well as commercial and recreational fishing activity, USCG maritime SAR, military vessel activity, and scientific and academic vessel traffic.<br><br>The likelihood of collisions, allisions, and other incidents is expected to continue at or near current rates. No substantial changes are anticipated to existing air and vessel traffic volumes. | New vessel traffic in the geographic analysis area would be generated by increased overall commercial and other vessel activity, as well as proposed barge routes and dredging demolition sites over the next 30 years. Marine commerce and related industries would continue to be important to the geographic analysis area economy. No substantial changes anticipated. |

IPF = impact-producing factor; SAR = search and rescue; USCG = U.S. Coast Guard; WTG = wind turbine generator

**Table G.1-12: Summary of Activities and the Associated Impact-Producing Factors for Recreation and Tourism**

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Anchoring and gear utilization | Anchoring occurs due to ongoing military, survey, commercial, and recreational activities. | Impacts from anchoring would continue and may 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 and localized impacts of navigational hazards, increased turbidity levels, and potential for direct contact causing mortality of benthic resources. |
| Cable emplacement and 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 recreation and tourism, there are six existing power cables. | Cable maintenance or replacement of existing cables in the geographic analysis area would occur infrequently and generate short-term disturbances. |
| Lighting | 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. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | 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. |
| Noise | The Block Island Wind Farm is the only operating facility that could generate operational noise within the geographic analysis area for recreation and tourism.<br>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.<br>Offshore trenching occurs periodically in connection with cable installation or sand and gravel mining.<br>Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to vessel noise include 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. |
| Port utilization | 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. Several ports (e.g., the MCT at the Port of New Bedford and the Port of Bridgeport) have been or are being upgraded specifically to support the construction of offshore wind energy facilities.<br>Nearly all ports and harbors in the geographic analysis area for recreation and tourism require periodic maintenance dredging. | Ports would need to perform maintenance and upgrade facilities over the next 30 years to ensure that they can still receive the projected future volume of vessels visiting their ports and are able to host larger deep draft vessels as they continue to increase in size.<br>Ongoing maintenance and dredging of harbors on Martha's Vineyard, Nantucket, and Cape Cod will continue as needed. No specific projects are known. |
| Presence of structures | The likelihood of allisions is expected to continue at or near current levels. Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures.<br>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 and other species are attracted to these locations. Recreational and commercial fishing can occur near these aggregation locations, although recreational fishing is more popular, as commercial mobile fishing gear is more likely to snag on structures.<br>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, as vessels need to avoid both the structure and each other. Current structures do not result in space use conflicts. | Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.<br>Vessel traffic, overall, is not expected to meaningfully increase over the next 30 years. The presence of navigation hazards is expected to continue at or near current levels.<br>Non-offshore wind structures that could be viewed in conjunction with the offshore components of the proposed Project would be limited to meteorological towers. Marine activity would also occur within the marine viewshed. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | The only existing offshore structures within the viewshed of the proposed Project are minor features such as buoys. | |
| Traffic | Ports and marine traffic related to shipping, fishing, and recreation in the geographic analysis area are important to the region's economy. No substantial changes are anticipated to existing vessel traffic volumes.<br><br>The region's substantial marine traffic may 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. | New vessel traffic near the geographic analysis area would be generated by proposed barge routes and dredging demolition sites over the next 30 years. Marine commerce and related industries would continue to be important to the geographic analysis area economy.<br><br>An increased risk of collisions is not anticipated from future activities. |

IPF = impact-producing factor; MCT = Marine Commerce Terminal

### Table G.1-13: Summary of Activities and the Associated Impact-Producing Factors for Scenic and Visual Resources

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Cable emplacement and maintenance | Infrequent cable maintenance activities generate vessel traffic that may be visible to observers on shore and at sea. | Cable maintenance or replacement of existing cables in the geographic analysis area would occur infrequently. |
| Lighting | Ocean vessels have an array of lights including navigational lights and deck lights that may be visible from locations on land and at sea. The maximum theoretical distance at which lights near the surface may be visible is approximately 48 miles, reflecting curvature of the earth and the coefficient of refraction (COP Appendix III-H.a; Epsilon 2022). Actual viewing distances are typically significantly shorter, due to the presence of obstructions (i.e., topography, vegetation, structures, and waves), as well as weather and atmospheric conditions that restrict visibility (i.e., fog, haze, sea spray, clouds, precipitation, and sun angle and intensity).<br><br>Offshore buoys and towers include vessel navigation safety lighting and may include aviation hazard lighting. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis. | The anticipated modest growth in regional vessel traffic would marginally increase the number of vessels operating at night with lighting.<br><br>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. The number of offshore structures other than those from offshore wind projects is expected to remain relatively constant. |
| Presence of structures | The only existing offshore structures within the viewshed of the proposed Project are minor features such as buoys. | Non-offshore wind structures that could be viewed in conjunction with the offshore components of the proposed Project would be limited to meteorological towers and buoys. The number of these offshore structures is expected to remain relatively constant. |
| Traffic | Vessel traffic related to shipping, fishing, and recreation are common, constant elements of seaward views. | Vessel traffic not associated with offshore wind is expected to increase along with increases in coastal population and marine-related economic activity. |

COP = Construction and Operations Plan; IPF = impact-producing factor

**Table G.1-14: Summary of Activities and the Associated Impact-Producing Factors for Air Quality**

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Accidental releases | Accidental releases of air toxics HAPs are due to potential chemical spills. Ongoing releases occur in low frequencies. These may lead to short-term periods of toxic pollutant emissions through surface evaporation. The DOE reports that 31,000 barrels of petroleum are spilled into U.S. waters from vessels and pipelines in a typical year. Globally, approximately 43.8 million barrels of oil were lost as a result of tanker incidents from 1970 to 2021, although this includes only 175,000 barrels from 2010 to 2021, indicative of significant reductions in spills over time (ITOPF 2022). | Accidental releases of air toxics or HAPs would be due to potential chemical spills. Gradually increasing vessel traffic over the next 30 years would increase the risk of accidental releases. These may 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 emissions | 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 improved over the last 30 years; however, some areas in the Northeast have experienced a recent decline in air quality. Some areas of the Atlantic coast remain in nonattainment for ozone, primarily from power generation. Many of these states (including Massachusetts and Connecticut, among others) have committed to clean energy goals to improve air quality and address climate change and have specifically included wind and solar energy generation as part of these goals. Primary processes and activities that can 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 30 years would occur during the construction stage of any project; however, project construction would be required to comply with the CAA. During the construction and decommissioning stages, emissions above *de minimis* thresholds would require offsets and mitigation. Primary emission sources include increased commercial vehicular traffic, air traffic, public vehicular traffic, and combustion emissions from construction equipment and fugitive emissions from construction-generated dust. As wind, solar, and other non-fossil fuel energy projects come online, power generation emissions overall would decline and the industry as a whole would have a net benefit on air quality.<br><br>Activities associated with operations and maintenance of onshore wind, solar, and other non-fossil fuel projects would have a proportionally minimal contribution to emissions compared to the construction and decommissioning activities over the next 30 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 minimal air quality impacts.<br><br>Many Atlantic states (including Massachusetts and Connecticut, among others) have committed to clean energy goals, and have committed to wind, solar, and other non-fossil fuel sources to achieve these goals.<br><br>In the absence of future offshore wind projects, power generation from non-fossil fuel sources would likely result in decreased air quality impacts regionally due to the avoidance or replacement of emissions from natural gas-, coal-, or oil-fired plants. Remaining fossil fuel facilities would likely have larger and continuous emissions and result in greater regional scale impacts on air quality. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Climate change | Activities that consume fossil fuels (such as construction, operations, and decommissioning of power generation and manufacturing facilities, as well as residential and commercial development) would produce GHG emissions (nearly all $CO_2$) that can contribute to climate change. $CO_2$ is relatively stable in the atmosphere and generally mixed uniformly throughout the troposphere and stratosphere. As a result, the impact of GHG emissions does not depend upon the source location. Increasing energy production from clean energy projects (reflecting state and national commitments) would likely decrease GHG emissions by replacing energy from fossil fuels. | Development of future onshore wind, solar, and other non-fossil fuel projects marginally increase GHG emissions over the next 30 years. However, these contributions would be minimal compared to aggregate global emissions. The impact on climate change from these activities would be negligible.<br><br>As more clean energy projects come online, some reduction in GHG emissions would occur. Overall, it is anticipated that there would be no collective adverse impact on global warming as a from onshore clean energy project activities. |

CAA = Clean Air Act; $CO_2$ = carbon dioxide; DOE = U.S. Department of Energy; GHG = greenhouse gas; HAP = hazardous air pollutant; IPF = impact-producing factor

**Table G.1-15: Summary of Activities and the Associated Impact-Producing Factors for Water Quality**

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Accidental releases | Accidental releases of fuels and fluids occur during vessel usage for dredged material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable-, lines-, and pipeline-laying activities. According to the DOE, 31,000 barrels of petroleum are spilled into U.S. waters from vessels and pipelines in a typical year. Globally, approximately 43.8 million barrels of oil were lost as a result of tanker incidents from 1970 to 2021, although this includes only 175,000 barrels from 2010 to 2021, indicative of significant reductions in spills over time (ITOPF 2022).<br><br>Trash and debris may be accidentally discharged through fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation; navigation and traffic; survey activities; and cables, lines, 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 limited spatial impact. | Future accidental releases of fuels and fluids from offshore vessel usage, spills, and consumption would likely continue on a similar trend. Impacts are unlikely to affect water quality.<br><br>As population and vessel traffic increase gradually over the next 30 years, accidental release of trash and debris may increase. However, there does not appear to be evidence that the volumes and extents anticipated would affect water quality. |
| Anchoring and gear utilization | Impacts from anchoring occur due to ongoing military use and survey, commercial, and recreational activities. | Impacts from anchoring may occur semi-regularly over the next 30 years due to offshore military operations or survey activities. These impacts would include increased seabed disturbance, resulting in increased turbidity levels. All impacts would be localized, short term, and temporary. |
| Cable emplacement and maintenance | Suspended sediment concentrations between 45 and 71 mg/L can occur in Nantucket Sound under natural tidal conditions and increase during storms, trawling, and vessel propulsion. Survey activities and cable- and pipeline-laying activities disturb bottom sediments and cause temporary increases in suspended sediment; these | Suspension of sediments may continue to occur infrequently over the next 30 years due to survey activities, as well as submarine cable-, lines-, and pipeline-laying activities. Future new cables, perhaps connecting Martha's Vineyard and/or Nantucket to the mainland, would occasionally disturb the seafloor and cause short-term |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | disturbances would be short term, and either be limited to the emplacement corridor or localized. | 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. |
| Discharges/intakes | Discharges affect 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 on Cape Cod is causing increased nutrient pollution in communities, approximately 80 percent of which is due to groundwater contamination by septic systems. 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 would be minimized because the USEPA established dredge spoil criteria and regulates the disposal permits issued by the USACE.<br><br>The impact on water quality from sediment suspension during future activities would be short term and localized. |
| Land disturbance | Ground-disturbing activities may lead to unvegetated or otherwise unstable soils. Precipitation events could potentially mobilize the soils into nearby surface waters, leading to potential erosion and sedimentation impacts and subsequent increased turbidity.<br><br>Onshore construction activities may lead to unvegetated or otherwise unstable soils, as well as soil contamination due to leaks or spills from construction equipment. Precipitation events could potentially mobilize the soils into nearby surface waters, leading to increased turbidity and alteration of water quality. | Ground disturbance associated with construction of onshore components could lead to unvegetated or unstable soils. Precipitation events could mobilize these soils, leading to erosion and sedimentation impacts and turbidity. Impacts from future offshore wind would be staggered in time and localized. The impacts would be short term and localized with an increased likelihood of impacts limited to onshore construction periods.<br><br>The general trend along coastal regions is that port activity will likely increase modestly in the future. This increase in activity includes expansion needed to meet commercial, industrial, and recreational demand. Modifications to cargo handling equipment and conversion of some undeveloped land to meet port demand would be required to receive the increase in larger ships. |
| Port utilization | 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 will increase modestly. The ability of ports to receive the increase in larger ships will require port modifications, which, along with additional vessel traffic, could affect 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. However, the existing suspended sediment concentrations in Nantucket Sound are already 45 to 71 mg/L; therefore, impacts from | The general trend along the coastal region from Virginia to Maine is that port activity will increase modestly over the next 30 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 affect water quality through increases in suspended sediments and the potential for accidental discharges. However, the existing suspended sediment concentrations in Nantucket Sound are already 45 to 71 mg/L, so impacts from vessel traffic are likely to be masked by the natural variability. Certain types of vessel traffic have |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | vessel traffic are likely to be masked by the natural variability. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future. | increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future. |
| Presence of structures | 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 affect 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 short-term and localized impacts. |

BOEM = Bureau of Ocean Energy Management; DOE = U.S. Department of Energy; FCC = Federal Communications Commission; IPF = impact-producing factor; mg/L = milligrams per liter; OCS = Outer Continental Shelf; USACE = U.S. Army Corps of Engineers; USEPA = U.S. Environmental Protection Agency

### Table G.1-16: Summary of Activities and the Associated Impact-Producing Factors for Bats

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Climate change | Increased storm activity during breeding and roosting season can reduce productivity and increase mortality. Intensity of this impact is speculative.<br>Disease can weaken, lower reproductive output, and/or kill individuals. Some tropical diseases could move northward due to climate change. Extent and intensity of this impact is highly speculative. | No future activities were identified within the geographic analysis area other than ongoing activities. |
| Land disturbance | Onshore construction activities are expected to continue at current trends. Potential impacts on individuals may occur if construction activities include tree removal when bats are potentially present. Injury or mortality may occur if trees being removed are occupied at the time of removal. Of particular sensitivity are juveniles that are unable to flush from the roost. While there is some potential for habitat impacts associated with habitat loss, no individual or population-level impacts 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 but would not be expected to result in injury or mortality of individuals. |
| Noise | Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. This would result in high-intensity, low-exposure level, long-term, but localized intermittent risk to bats in nearshore waters. Auditory impacts are not expected to occur, as recent research has shown that bats may be less sensitive to TTS than other terrestrial mammals (Simmons et al. 2016). Habitat 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.<br>Onshore construction occurs regularly for infrastructure projects in the geographic analysis area. There is a potential for displacement caused by equipment if construction occurs at night (Schaub et al. 2008). Displacement, if any, would be temporary. No individual or population-level impacts would be | 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 likely not result in auditory impacts. Some habitat impacts (i.e., displacement from potentially suitable foraging and/or roosting 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 impacts would be expected.<br>Onshore construction is expected to continue at current trends. Behavioral responses and avoidance of construction areas may occur (Schaub et al. 2008). However, no injury or mortality of individuals would be expected. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | expected. Bats roosting in the vicinity of construction activities may be disturbed during construction but would be expected to move to a different roost farther from construction noise. No impacts would be expected, as frequent roost switching is a common component of a bat's life history (Hann et al. 2017; Whitaker 1998). | |
| Presence of structures | Few structures are scattered throughout the offshore portion of the geographic analysis area. There is an assortment of navigation and weather buoys and a handful of light towers (BOEM 2022b). 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 limited and generally restricted to spring and fall migration. Very few bats would be expected to encounter structures on the OCS, and no individual or population-level impacts would be expected.<br><br>Few structures are in the offshore bat geographic analysis area. There is an assortment of navigation and weather buoys plus a handful of light towers (NOAA 2020). Migrating tree bats can easily fly around or over these sparsely distributed structures, and no turbine strikes would be expected. | The infrequent installation of future new structures in the marine environment over the next 30 years is expected to continue. These structures would not be expected to cause disturbance to migrating tree bats.<br><br>The infrequent installation of future new structures in the marine environment of the next 30 years is expected to continue. These structures would not be expected to result in increased collision risk to migrating tree bats in the marine environment. |

IPF = impact-producing factor; OCS = Outer Continental Shelf; TTS = temporary threshold shift

### Table G.1-17: Summary of Activities and the Associated Impact-Producing Factors for Birds

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Accidental releases | Ongoing releases of fuels and fluids 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 impacts 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.<br><br>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 cables, lines, and pipeline laying on an ongoing basis. In a study from 2010, students at sea collected more 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 may accidentally ingest trash mistaken for prey. Mortality is typically a result of | Gradually increasing vessel traffic over the next 30 years would increase the potential risk of accidental releases of fuels and fluids and associated impacts, including mortality, decreased fitness, and health impacts on individuals. Impacts are unlikely to affect populations.<br><br>As population and vessel traffic increase gradually over the next 30 years, accidental release of trash and debris may increase. This may result in increased injury or mortality of individuals. However, there does not appear to be evidence that the volumes and extents would have any impact on bird populations. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | blockages caused by both hard and soft plastic debris (Roman et al. 2019). | |
| Cable emplacement and maintenance | Cable emplacement and maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances will be temporary and generally limited to the emplacement corridor. In the geographic analysis area, there are six existing power cables (see BOEM 2019a for details). Impacts from suspended sediment include reduced foraging success, as vision is an important component of seabird foraging activity (Cook and Burton 2010). Additionally, impacts may occur as a result of impacts on prey species. 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, perhaps connecting Martha's Vineyard and/or Nantucket to the mainland, would occasionally disturb the seafloor and cause temporary increases in suspended sediment, resulting in localized and short-term impacts. The FCC has two pending submarine telecommunications cable applications in the North Atlantic. Impacts would be temporary and localized, with no biologically significant impacts on individuals or populations. |
| Climate change | Increased storm frequency and severity during the breeding season can reduce productivity of bird nesting colonies and kill adults, eggs, and chicks.<br><br>Increasing ocean acidification may 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.<br><br>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 frequencies and distributions of various diseases of birds, as well as the distribution of bird prey resources.<br><br>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 (0.7 mile per hour; 9.6 percent) during spring migration by 2091, and wind assistance is projected to decrease within eastern portions of the continent (0.4 mile per hour; 6.6 percent) during autumn migration (La Sorte et al. 2019).<br><br>The proliferation of coastline protections has the potential to result in long-term and high-consequence, impacts on bird nesting habitat. | No future activities were identified within the geographic analysis area other than ongoing activities. |
| Land disturbance | Onshore construction activity will continue at current trends. There is some potential for impacts associated with habitat loss and fragmentation. No individual or population-level impacts 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 but would not be expected to result in injury or mortality of individuals. |
| Lighting | 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 but | Gradually increasing vessel traffic over the next 30 years would increase the potential for bird and vessel interactions. While birds may be attracted to vessel lights, this attraction would not be expected to result in increased risk of |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| | may lead to accidental trash ingestion (see accidental releases). Population-level impacts would not be expected.<br><br>Offshore buoys and towers emit light, and onshore structures, including houses and ports, emit a great deal more light on an ongoing basis. Buoys, towers, and onshore structures with lights can attract birds. This attraction has the potential to result in an increased risk of collision with lighted structures (Hűppop et al. 2006). Light from structures is widespread and permanent near the coast but minimal offshore. | collision with vessels but may lead to accidental trash ingestion (see accidental releases). No population-level impacts would be expected.<br><br>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. |
| Noise | Aircraft routinely travel in the geographic analysis area. 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 may flush, resulting in non-biologically 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.<br><br>Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities could result in impacts on diving birds due to displacement by the use of active acoustic equipment and other active acoustic equipment. 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.<br><br>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, and 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.<br><br>Onshore construction is routinely used in infrastructure projects. Equipment could potentially cause displacement. Any displacement would only be temporary, and no individual fitness or population-level impacts would be expected.<br><br>Ongoing vessel noise activities that contribute to this IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Subsurface noise from vessels could disturb diving birds foraging for prey below the surface. The impact on birds would be similar to noise from G&G but likely less because noise levels are lower. | 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 may flush, resulting in non-biologically 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.<br><br>The impact of future site characterization surveys and pile driving would be the same as ongoing activities, with the addition of possible future oil and gas surveys.<br><br>Onshore construction will continue at current trends. Some behavior responses could range from escape behavior to mild annoyance, but no individual injury or mortality would be expected. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Presence of structures | Each year, 2,551 seabirds die from interactions with U.S. commercial fisheries on the Atlantic (Sigourney et al. 2019). Even more die due to abandoned commercial fishing gear (nets); a reduction in derelict fishing gear has a beneficial impact on bird populations (Regular et al. 2013). 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.<br><br>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. These impacts are local and can be short term to permanent. These fish aggregations can provide localized, short-term to permanent, beneficial impacts on some bird species due to increased prey species availability. Likewise, structures may attract recreational fishing.<br><br>The area includes an assortment of navigation and weather buoys plus a handful of light towers (BOEM 2022b). Migrating birds can easily fly around or over these sparely distributed structures. 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 may be attracted to these structures and opportunistically roost on these structures. | New cables installed incrementally in the geographic analysis area for birds over the next 20 to 30 years would likely require hard protection atop portions of the cables (see cable emplacement and maintenance row). 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 may increase. These impacts are expected to be local and may be short term to permanent. These fish aggregations can provide localized, short-term to permanent beneficial impacts on some bird species due to increased prey species availability.<br><br>The infrequent installation of future new structures in the marine environment over the next 30 years would not be expected to result in migration disturbances or an increase in collision risk or result in displacement. Some potential for attraction and opportunistic roosting exists but would be limited given the limited anticipated number of structures. |
| 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 with the current trend in commercial air travel. Aircraft would continue to be used to conduct scientific research studies, as well as wildlife monitoring and pre-construction surveys. These flights would be well below the 100,000 flights, and no bird strikes would be expected to occur. |

BOEM = Bureau of Ocean Energy Management; FCC = Federal Communications Commission; G&G = geological and geophysical; GHG = greenhouse gas; IPF = impact-producing factor

**Table G.1-18: Summary of Activities and the Associated Impact-Producing Factors for Terrestrial Habitats and Fauna**

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Climate change | 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 30 years. | No future activities were identified within the geographic analysis area other than ongoing activities. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
| --- | --- | --- |
| Land disturbance | Periodic ground-disturbing activities contribute to elevated levels of erosion and sedimentation but usually not to a degree that affects terrestrial habitats and fauna, assuming that industry standard BMPs are implemented.<br>Periodic clearing of shrubs and tree saplings along existing utility ROWs causes disturbance and temporary displacement of mobile species and may 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 localized, temporary impacts.<br>Periodically, undeveloped parcels are cleared and developed for human uses, permanently changing the condition of those parcels as habitat for terrestrial fauna. 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 future activities were identified within the geographic analysis area other than ongoing activities. |
| Noise | Periodically, construction noise and vibration associated with new development and maintenance occurs, potentially leading to the disturbance and temporary displacement of mobile species. These impacts are likely minimal in the context of existing vehicle, commercial, and industrial noises in the geographic analysis area. | No future activities were identified within the geographic analysis area other than ongoing activities. |

BMP = best management practice; GHG = greenhouse gas; IPF = impact-producing factor; ROW = right-of-way

### Table G.1-19: Summary of Activities and the Associated Impact-Producing Factors for Wetlands and Other Waters of the United States

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
| --- | --- | --- |
| Accidental releases | Accidental releases of fuel, fluids, and hazardous materials have the potential to cause contamination and harm to water resources from releases and/or cleanup activities. Activities will not occur within 100 feet of wetlands, waterbodies, or known private or community potable wells. A spill prevention, control, and countermeasure plan, in accordance with applicable requirements, will outline spill prevention plans and measures to contain and clean up spills if they were to occur. Impacts are localized, temporary, and negligible. | No future activities were identified within the geographic analysis area other than ongoing activities. |
| Climate change | Climate change, influenced in part by ongoing GHG emissions, is expected to continue to contribute to impacts on wetlands due to changes in temperature and in the frequency and amount of precipitation. Impacts are uncertain but expected to be minor. | No future activities were identified within the geographic analysis area other than ongoing activities. |

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Land disturbance | Ongoing development of onshore properties, especially the OECR and onshore substation, has the potential to cause an increase in sedimentation in the geographic analysis area. Impacts are localized, temporary, and negligible. This development could also degrade water quality in tidal and freshwater wetlands. Different crossing methods could be utilized to minimize impacts on the Centerville River or other wetlands. Impacts are localized, temporary, and negligible. | No future activities were identified within the geographic analysis area other than ongoing activities. |

GHG = greenhouse gas; IPF = impact-producing factor; OECR = onshore export cable route

**Table G.1-20: Summary of Activities and the Associated Impact-Producing Factors for Land Use and Coastal Infrastructure**

| Associated IPFs | Ongoing Activities | Future Non-Offshore Wind Activities Intensity/Extent |
|---|---|---|
| Accidental releases | Various ongoing onshore and coastal construction projects include vehicles and equipment that contain fuel, fluids, and hazardous materials that could result in an accidental release. | Ongoing onshore construction projects involve vehicles and equipment that use fuel, fluids, or hazardous materials that could result in an accidental release. Intensity and extent would vary, depending on the size, location, and materials involved in the release. |
| Land disturbance | Onshore construction supports local population growth, employment, and economics, which, in turn, could lead to new development or redevelopment that disturbs land. New development or redevelopment would result in changes in land use in accordance with local government land use plans and regulations. | Onshore development would continue in accordance with local government land use plans and regulations and is, thus, anticipated to reinforce existing land use patterns, based on local government planning documents. |
| Lighting | Various ongoing onshore and coastal construction projects have nighttime activities, as well as existing structures, facilities, and vehicles, which 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. |
| Port utilization | 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 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 are able to host larger deep draft vessels as they continue to increase in size. |
| Presence of structures | The only existing offshore structures within the offshore viewshed of the proposed Project are minor features such as buoys.<br><br>Onshore buried transmission cables are present in the area near the proposed 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. | Non-offshore wind structures that could be viewed in conjunction with the offshore components would be limited to meteorological towers. Marine activity would also occur within the marine viewshed. |

IPF = impact-producing factor; MCT = Marine Commerce Terminal

# G.2 Assessment of Resources with Minor (or Lower) Impacts

## G.2.1 Air Quality

The proposed Project's wind turbine generators (WTG), electrical service platforms (ESP), and offshore export cable corridor (OECC) would not generate air emissions during normal operations; however, air emissions from equipment used in the construction and installation (construction), operations and maintenance (operations), and conceptual decommissioning (decommissioning) stages could impact air quality in the proposed Project area and nearby coastal waters and shore areas. Most emissions would occur temporarily during construction, offshore in the Southern Wind Development Area (SWDA), onshore at the landfall site, along the OECC and onshore export cable route (OECR), at the onshore substation, and at the construction staging area. Additional emissions related to the proposed Project could also occur at nearby ports used to transport material and personnel to and from the proposed Project site. However, the proposed Project would provide beneficial impacts on air quality in comparison to fossil fuel power-generating stations (Volume III, Section 4.1; Epsilon 2022). Both Phase 1 and 2 of the proposed Project would contribute to a reduction of more than 3.93 million tons per year of carbon dioxide equivalent ($CO_2e$) from the electric grid, up to 2,103 tons of nitrogen oxides ($NO_x$), and up to 1,116 tons of sulfur dioxide ($SO_2$) per year, compared to power derived from fossil fuels.

### G.2.1.1 Description of the Affected Environment

This section discusses the existing air quality in the geographic analysis area, as described in Table D-1 in EIS Appendix D, Geographical Analysis Areas, and shown on Figure G.2.1-1. The air quality geographic analysis area includes the airshed within 15.5 miles of each area potentially impacted by the proposed Project, including the lease area, onshore construction areas, and construction ports. Table G.1-14 describes existing conditions and the impacts, based on the impact-producing factors (IPF) of ongoing and future offshore activities other than offshore wind, which is discussed below.

Air quality within a region is measured in comparison to the National Ambient Air Quality Standards (NAAQS), which are standards established by the U.S. Environmental Protection Agency (USEPA) pursuant to the Clean Air Act (CAA) in U.S. Code, Title 42, Section 7409 (42 USC § 7409) for criteria pollutants to protect human health and welfare. The criteria pollutants are carbon monoxide (CO), $SO_2$, particulate matter smaller than 10 microns ($PM_{10}$), particulate matter smaller than 2.5 microns ($PM_{2.5}$), nitrogen dioxide ($NO_2$), ozone ($O_3$), and lead.

The USEPA classifies all areas of the country as in attainment, nonattainment, or unclassified for each criteria pollutant. An attainment area complies with all NAAQS. A nonattainment area does not meet NAAQS for one or more pollutants. Unclassified areas are where attainment status cannot be determined based on available information and are treated as attainment areas. An area can be in attainment for some pollutants and nonattainment for others.

The attainment status of an area can be found in the Code of Federal Regulations, Title 40, Section 81 (40 CFR § 81) and in the USEPA Green Book, which the agency revises periodically (USEPA 2022). Attainment status is determined through evaluation of air quality data from a network of monitors.

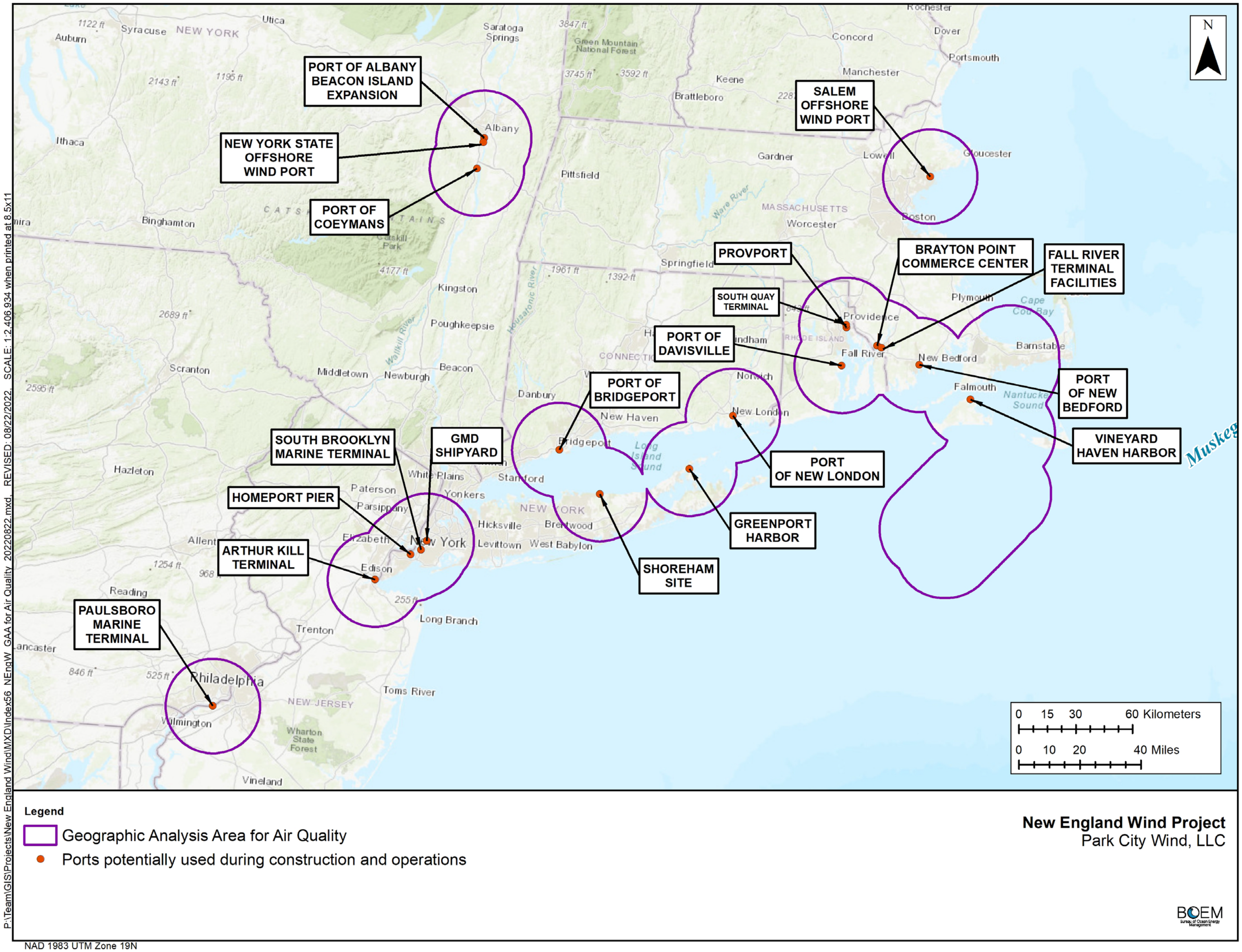


**Figure G.2.1-1: Geographic Analysis Area for Air Quality**

The CAA amendments directed the USEPA to establish requirements to control air pollution from Outer Continental Shelf (OCS) oil- and gas-related activities along the Pacific, Arctic, and Atlantic coasts, and along the U.S. Gulf Coast of Florida, eastward of 87º 30′ longitude. The OCS Air Regulations (40 CFR § 55) establish the applicable air pollution control requirements, including provisions related to permitting, monitoring, reporting, fees, compliance, and enforcement for facilities subject to the CAA. These regulations apply to OCS sources that are located beyond state seaward boundaries. Applicants within 25 nautical miles (28.8 miles) of a state seaward boundary are required to comply with the air quality requirements of the nearest or corresponding onshore area, including applicable permitting requirements.

This section assesses the expected level of impacts from each stage of the proposed Project. Emissions from the proposed Project would exceed USEPA major source thresholds under the Prevention of Significant Deterioration and New Source Review programs, which evaluate the emissions from new or expanded projects in the context of air quality standards. The "major" source definition is unrelated to the assessment of expected impacts described in the following sections. Air quality impacts would be permitted as part of the OCS permitting process, which includes a detailed emissions inventory for the proposed Project design activities, such as engine sizes and activity durations.

The proposed Project may generate air emissions within Massachusetts, Rhode Island, New York, New Jersey, Connecticut, and Pennsylvania. The proposed Project has identified several port facilities in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey that may be used for major Phase 1 construction staging activities; however, the proposed Project may need to stage certain activities at other commercial seaports. If a port in one of the aforementioned states is used during construction, proposed Project-related air emissions could potentially occur in the counties discussed below. For Phase 1, the proposed Project has proposed operations facilities in Bridgeport, Connecticut, and Vineyard Haven, Massachusetts (EIS Section G.2.7, Land Use and Coastal Infrastructure).

All southeastern Massachusetts is presently designated as unclassifiable or in attainment for all criteria pollutants (Construction and Operations Plan [COP] Volume III, Section 5.1; Epsilon 2022), except for Dukes County (which includes Martha's Vineyard), which is designated as marginally in nonattainment for the 2008 $O_3$ NAAQS. This designation was based on data collected at the Herring Creek Road Aquinnah monitor (Monitor #25-007-0001) from 2009 to 2011, which showed a monitored concentration of 76 parts per billion (ppb) against the 2008 NAAQS of 75 ppb. While the 2008 NAAQS remain in effect, Dukes County was designated in attainment in August 2018 against the more stringent 2015 $O_3$ NAAQS of 70 ppb; as noted in the Federal Register, Volume 80, Issue 206 (October 26, 2015), pp. 65121–65603 (80 Fed. Reg. 206 pp. 65121–65603); based on a monitored concentration of 64.3 ppb between 2014 and 2016. Thus, while the 2008 designation has not yet been changed, monitored values in Dukes County have significantly improved since 2011. The USEPA has administrative responsibility for changing this designation to attainment but has not yet done so.

Emissions from the proposed Project may occur within the New York Metropolitan Area, including Fairfield, Middlesex, and New Haven counties in Connecticut; Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, and Westchester counties in New York; and Bergen, Hudson, Middlesex, and Monmouth counties in New Jersey. The New York Metropolitan Area is classified as being in serious nonattainment with the 2008 8-hour $O_3$ standard and moderate nonattainment for the revised 2015 $O_3$ standard (USEPA 2022). The region is also in maintenance for CO (since 1971) and $PM_{2.5}$ (since 2006).

Outside of the New York Metropolitan Area, the Greater Connecticut area is designated as being in serious nonattainment for the 2008 $O_3$ NAAQS but in marginal nonattainment with the 2015 $O_3$ standard (USEPA 2022). The entire State of Rhode Island is currently in attainment for all criteria pollutants. Use of ports on the Hudson River in the New York Capital Region could generate emissions in Putnam, Orange, Dutchess, Ulster, Columbia, Greene, Rensselaer, and Albany counties, each of which is in attainment for all criteria pollutants, with the exception of Orange County, which is in nonattainment for $PM_{2.5}$ (USEPA 2022).

The proposed Project may cause emissions along the Delaware River within Cape May, Cumberland, Gloucester, and Salem counties in New Jersey; Kent, New Castle, and Sussex counties in Delaware; and Delaware County in Pennsylvania. Each of these counties is in attainment with NAAQS for lead, CO, $NO_2$, $PM_{2.5}$ and $PM_{10}$, and $SO_2$. Sussex County is in marginal nonattainment with the 2008 $O_3$ standard but is in attainment with the more stringent 2015 $O_3$ standard, and Kent County is in attainment for $O_3$. The Philadelphia-Wilmington-Atlantic City region includes Cape May, Cumberland, Gloucester, Salem, New Castle, and Delaware counties and is in marginal nonattainment for both the 2008 and 2015 $O_3$ standards.

### G.2.1.2 Environmental Consequences

Definitions of impact levels for air quality are described in Table G.2.1-1. Impact levels are intended to serve National Environmental Policy Act (NEPA) purposes only and are not intended to establish thresholds or other requirements with respect to permitting under the CAA.

**Table G.2.1-1: Impact Level Definitions for Air Quality**

| Impact Level | Impact Type | Definition |
|---|---|---|
| Negligible | Adverse | Increases in ambient pollutant concentrations due to proposed Project emissions would not be detectable. |
| | Beneficial | Decreases in ambient pollutant concentrations due to proposed Project emissions would not be detectable. |
| Minor to Moderate | Adverse | Increases in ambient pollutant concentrations due to proposed Project emissions would be detectable but would not lead to exceedance of the NAAQS. |
| | Beneficial | Decreases in ambient pollutant concentrations due to proposed Project emissions would be detectable. |
| Major | Adverse | Changes in ambient pollutant concentrations due to proposed Project emissions would lead to exceedance of the NAAQS. |
| | Beneficial | Decreases in ambient pollutant concentrations due to proposed Project emissions would be larger than for minor to moderate impacts. |

NAAQS = National Ambient Air Quality Standards

### Impacts of Alternative A – No Action Alternative on Air Quality

When analyzing the impacts of Alternative A on air quality, the Bureau of Ocean Energy Management (BOEM) considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the existing conditions for air quality infrastructure (Table G.1-14). The cumulative impacts of Alternative A considered the impacts of Alternative A in combination with other planned non-offshore wind and offshore wind activities, as described in EIS Appendix E, Planned Activities Scenario.

Under Alternative A, existing conditions for air quality described in Section G.2.1.1 would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore wind activities within the geographic analysis area that contribute to impacts on air quality include the need to construct and operate new energy generation facilities to meet future power demands. Reflecting market forces and state energy policies, these future electric-generating units would most likely include natural-gas-fired and oil-fired dual fuel facilities, and a mix of natural gas, dual fuel natural gas/oil, solar, wind, and energy storage. Under Alternative A, emissions and impacts from future fossil fuel facilities would be partially mitigated by installation of other offshore wind projects surrounding the proposed geographic analysis area, including in the region off New York and New Jersey, as described below.

Ongoing offshore wind activities within the geographic analysis area that contribute to impacts on air quality include construction, operation, and decommissioning of the Vineyard Wind 1 project in Lease Area OCS-A 0501, as well as other ongoing offshore wind projects that use the ports listed in Table 2.1-4 in EIS Chapter 2, Alternatives. Ongoing and planned activities (including offshore wind) would affect land use and coastal infrastructure through the primary IPFs described below.

***Cumulative Impacts***

The cumulative impact analysis for Alternative A considers the impacts of Alternative A in combination with other planned non-offshore wind activities and planned offshore wind activities (other than Alternative B). Future offshore wind activities would affect air quality through the following primary IPFs.

**Accidental releases:** Future offshore wind activities could release air toxics or hazardous air pollutants (HAP) because of accidental chemical spills within the air quality geographic analysis area. EIS Section G.2.2, Water Quality, includes a discussion of the nature of releases anticipated. As shown in Table E-1, up to about 528,331 gallons of coolants, 2,959,716 gallons of oils and lubricants, and 434,680 gallons of diesel fuel would be contained in the 570 WTG and ESP foundations (other than the proposed Project) constructed within the air quality geographic analysis area. Accidental releases would be most likely during construction but could occur during operations and decommissioning of offshore wind facilities. These may lead to short-term periods of HAP emissions through surface evaporation. HAP emissions would consist of volatile organic compounds (VOC), which may be important for $O_3$ production. By comparison, the smallest tanker vessel operating in these waters (a general-purpose tanker) has a capacity of between 3.2 and 8 million gallons. As described in EIS Section G.2.2, tankers are relatively common in these waters, and the total WTG and ESP chemical storage capacity within the air quality geographic analysis area is much less than the volume of hazardous liquids transported by ongoing activities (U.S. Energy Information Administration 2014). Air quality impacts from accidental releases would be short term and limited to the area near the accidental release location. Accidental releases would occur infrequently over a 30-year period, with a higher probability of spills during future project construction, but they would not be expected to appreciably contribute to overall impacts on air quality.

**Air emissions:** Most air pollutant emissions and air quality impacts from future offshore wind projects would occur during construction, potentially from multiple co-occurring projects. All projects would be required to comply with the CAA. During the limited times of construction and decommissioning, emissions might exceed *de minimis* thresholds, requiring offsets and mitigation. Primary emission sources would include increased commercial vehicular traffic, air traffic, public vehicular traffic, construction equipment, and fugitive emissions leaks. As projects come online, emissions overall would decline, and the projects would benefit air quality overall.

The future offshore wind projects that may result in air emissions and air quality impacts within the air quality geographic analysis area include the entirety of projects within lease areas OCS-A 0487 (Revolution Wind), OCS-A 0500 (Bay State Wind), OCS-A 0501 (Vineyard Wind 1), OCS-A 0520 (Beacon Wind), and OCS-A 0521 (Mayflower Wind), and a portion of OCS-A 0486 (Sunrise Wind) (Table E-1). Based on the planned activities assumptions in Table E-1, the portions of these projects within the geographic analysis area would produce approximately 5,751 megawatts (MW) of renewable power from the installation of up to 570 WTG and ESP foundations. Based on the assumed offshore foundation construction schedule in Table E-1, those projects within the geographic analysis area would have overlapping construction periods beginning in 2022 and continuing through 2030. The total construction emissions of criteria pollutants (CO, $NO_2$, $PM_{10}$, $PM_{2.5}$, $SO_2$, and VOCs) are shown in Table G.2.1-2.

**Table G.2.1-2: 2022–2030 Construction Emissions, Future Offshore Wind Projects, Geographic Analysis Area**

| Project | Total Emissions (tons)[a] | | | | | | |
|---|---|---|---|---|---|---|---|
| | $NO_x$ | VOCs | CO | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | $CO_2e$ |
| Sunrise Wind (OCS-A 0486) | 1,378 | 32 | 573 | 25 | 25 | 1 | 149,639 |
| Revolution Wind (OCS-A 0487) | 4,124 | 85 | 1,008 | 135 | 130 | 13 | 278,696 |
| Vineyard Wind 1 (OCS-A 0501) | 4,961 | 122 | 1,116 | 172 | 166 | 38 | 318,660 |
| Bay State Wind (OCS-A 0500)[b] | 9,167 | 200 | 2,259 | 346 | 335 | 56 | 631,707 |
| Beacon Wind (OCS-A 0520)[b] | 8,723 | 191 | 2,150 | 329 | 318 | 54 | 601,077 |
| Mayflower Wind (OCS-A 0521)[b] | 8,278 | 181 | 2,040 | 312 | 302 | 51 | 570,450 |
| **Total** | **36,631** | **811** | **9,146** | **1,319** | **1,276** | **213** | **2,550,331** |

CO = carbon monoxide; $CO_2e$ = carbon dioxide equivalent; HAP = hazardous air pollutant; $NO_x$ = nitrogen oxide; $PM_{2.5}$ = particulate matter smaller than 2.5 microns; $PM_{10}$ = particulate matter smaller than 10 microns; RI/MA Lease Areas = Rhode Island/Massachusetts Lease Areas; $SO_2$ = sulfur dioxide; VOC = volatile organic compound

[a] This includes only the portion of other offshore wind projects within the geographic analysis area for air quality. Emissions from projects partially within the geographic analysis area (e.g., Sunrise Wind) were pro-rated based on the share of potential foundations from that project within the geographic analysis area.

[b] Emissions data for the Bay State Wind (OCS-A 0500), Beacon Wind (OCS-A 0520), and Mayflower Wind (OCS-A 0521) are not publicly available and were estimated based on the ratio of total combined emissions (by pollutant) to total combined foundations constructed for the other offshore wind projects in the RI/MA Lease Areas.

The carbon dioxide ($CO_2$) construction emissions make up the largest percentage of total construction-stage emissions, resulting in about 2.5 million tons of $CO_2$ emissions for the projects within the air quality geographic analysis area (other than the proposed Project). Overall, construction and decommissioning stages would have the largest emissions. The largest emissions of criteria pollutants would be $NO_x$ (36,631 tons) and CO (9,146 tons), most from diesel construction equipment, vessels, and commercial vehicles. The magnitude of the air emissions and the air quality impacts would vary spatially and temporally during the construction stages even for overlapping projects. This spatial and temporal variability assumes that construction activity would occur at different locations and always overlap with activities at other locations. As a result, air quality impacts would shift spatially and temporally across the air quality geographic analysis area.

Future offshore wind projects within the air quality geographic analysis area would overlap during operations, but operations would contribute few criteria pollutant emissions compared to construction and decommissioning and would come largely from commercial vessel traffic and emergency diesel generators. Using the assumptions in Table E-1, Alternative A could generate up to approximately 4,000 tons per year of operations emissions in the air quality geographic analysis area beginning in 2030 and continuing for the life of the projects. The largest emissions would be $NO_x$ (2,983 tons per year) and CO (780 tons per year). The other criteria pollutants would each account for approximately 50 to 100 tons per year of operations emissions. Operations air emissions would overall be short term, intermittent, widely dispersed, and generally contribute to small and localized air quality impacts.

Operations of future offshore wind projects would result in 241,595 tons of $CO_2e$ emissions per year. Greenhouse gases (GHG) are important for assessing climate change impacts. However, they are not criteria pollutants and are not included in air quality impact analyses. Common GHGs include $CO_2$, methane, and nitrous oxide. GHG emissions are calculated as CO2e to express their warming influences in a common metric.

Offshore wind energy development would help offset emissions from fossil fuels, improving regional air quality and reducing GHGs. An analysis by Katzenstein and Apt (2009), for example, estimates that $CO_2$ emissions can be reduced by up to 80 percent and $NO_x$ emissions can be reduced up to 50 percent by implementing wind energy projects.

Estimations and evaluations of potential health and climate benefits from offshore wind activities for specific regions and project sizes, compared to health trends from equivalent amounts of fossil fuel energy development, rely on information about the air emission contributions of the existing mix of power generation sources and generally determine the annual health benefits of an individual commercial scale offshore wind project to be valued in the hundreds of millions of dollars (Kempton et al. 2005; Buonocore et al. 2016). An evaluation of health and climate benefits of offshore wind projects in the Mid-Atlantic United States, compared to health trends from comparable amounts of fossil fuel energy development, examined a range of project sizes and connecting states (Buonocore et al. 2016). While the air emissions profile for a particular grid region will affect the level of benefits (compared to health impacts from equivalent amounts of fossil fuel energy) experienced, a representative range of potential annual health benefits (in dollars) and annual premature deaths avoided with 22 gigawatts of future offshore wind development is presented in Table G.2.1-3. These ranges were created by converting the scenarios analyzed in Buonocore et al. (2016) to dollars and annual premature deaths avoided per megawatt hour (MWh), and assuming a conservative 45 percent average net capacity factor across all future offshore wind development in the Atlantic Ocean. Net capacity factor refers to the proportion of actual energy generation over time over the maximum generation capacity over time.

**Table G.2.1-3: Representative Range of Annual Health and Climate Benefits and Annual Premature Deaths Avoided from 22 Gigawatts of Offshore Wind Development**

| Planned Action Estimate Range Level | Annual Air Quality Health Benefit | Annual Premature Deaths Avoided | Notes |
|---|---|---|---|
| Low | $4.64 billion | 463 | This range includes the smallest financial impacts per MWh and number of deaths avoided. |
| Medium | $7.42 billion | 571 | This range includes the mean financial impact per MWh and number of deaths avoided. |
| High | $10.32 billion | 971 | This range includes the largest financial impact per MWh and number of deaths avoided. |

Source: Buonocore et al. 2016

MWh = megawatt hour

**Climate change:** Construction and operations of offshore wind projects would produce GHG emissions (nearly all $CO_2$) that contribute to climate change; however, these contributions would be minuscule compared to aggregate global emissions. $CO_2$ is relatively stable in the atmosphere and for the most part 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 GHGs emissions by replacing energy from fossil fuels. This reduction would more than offset the limited GHG emissions from offshore wind projects. U.S. offshore wind projects would likely have a limited impact on global emissions and climate change, but they may be significant and beneficial as a component of many actions addressing climate change and integral for fulfilling state plans regarding climate change.

### *Conclusions*

**Impacts of Alternative A.** Under Alternative A, air quality would continue to follow current regional trends and respond to current and future environmental and societal activities. Furthermore, additional, more polluting, fossil fuel energy facilities would come, or be kept, online to meet future power demand, fired by natural gas, oil, or coal. These larger impacts would be mitigated partially by other future offshore wind projects surrounding the geographic analysis area, including offshore New York and New Jersey.

While the proposed Project would not be built under Alternative A, ongoing activities would have continuing regional air quality impacts primarily through air emissions, accidental releases, and climate change. The impacts of ongoing activities, such as those from air emissions and GHGs, would be **moderate**.

**Cumulative Impacts of Alternative A.** In addition to ongoing activities, planned activities other than offshore wind may also contribute to impacts on air quality. Planned activities other than offshore wind include increasing air emission and GHG through construction and operations of new energy generation facilities to meet future power demands (Table G.1-14). These facilities may consist of new natural gas-fired power plants, coal-fired, oil-fired, or clean-coal-fired plants. The impacts of planned activities other than offshore wind would be **moderate**. The combination of ongoing and planned activities would result in **moderate** cumulative 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, ongoing and planned activities in the geographic analysis area would result in **minor** cumulative impacts due to emissions of CO, $NO_2$, $SO_2$, particulates, and some air toxics, mostly released during construction and decommissioning. Emissions during operations would be generally lower and more temporary, with emissions of $NO_x$ and CO from combustion sources predominating. $CO_2$, a GHG but not a criteria pollutant, would contribute most emissions during construction and operations. Most air emissions and air quality impacts would occur during multiple overlapping project construction stages from 2023 through 2027 (Table E-1). Overall, air quality impacts from future offshore wind projects are expected to be relatively small and temporary. Other future offshore wind projects would likely lead to reduced emissions from fossil-fuel power-generating facilities and **minor** to **moderate** beneficial impacts on air quality.

**Relevant Design Parameters and Potential Variances in Impacts**

The following proposed Project design parameters (EIS Appendix C, Project Design Envelope and Maximum-Case Scenario) would influence the magnitude of the impacts on air quality:

- Air emission ratings of construction equipment engines;
- Location of construction laydown areas;
- Choice of cable-laying locations and pathways;
- Choice of marine traffic routes to and from the SWDA and OECC;
- Soil characteristics at excavation areas for fugitive emissions determination; and
- Emission control strategy for fugitive emissions due to excavation and hauling operations.

Changes to the design capacity of the turbines would not alter the maximum potential air quality impacts for Alternative B because the maximum-case scenario involved the maximum number of WTGs (62 for Phase 1, up to 88 for Phase 2) allowed in the proposed-Project design envelope (PDE).

**Impacts of Alternative B – Proposed Action on Air Quality**

This section identifies potential impacts of Alternative B on air quality.

***Impacts of Phase 1***

Air emissions during construction of Phase 1 would primarily come from the main propulsion engines, auxiliary engines, and auxiliary equipment on marine vessels used during construction activities. Emissions from vessel engines would occur while vessels install offshore facilities within the SWDA, during installation of the offshore export cables, during vessel transits to and from port, and while vessels are in port (COP Volume I, Sections 3.2.2.5 and 4.2.2.5; Epsilon 2022).

Primary emission sources would be increased commercial vessel traffic, air traffic, public vehicular traffic, combustion emissions from construction equipment, and some fugitive emissions. Construction impacts would also likely affect air quality over a larger spatial area in comparison to operations because of the increased emissions during various construction activities. Reduced levels of emissions and lower magnitude air quality impacts would occur during the decommissioning stage. As Alternative B and other future offshore wind projects come online, power generation emissions in the region would reduce emissions over time, and this would contribute to a net benefit on air quality regionally. Most air quality impacts would remain offshore because the highest emissions would occur in this region, and the westward prevailing winds would result in most plumes remaining offshore. Phase 1 activities would be required to comply with the CAA, and emissions may exceed *de minimis* thresholds, requiring offsets and mitigation.

During the construction stage, the activities of additional workers, increased traffic congestion, additional commuting miles for construction personnel, and increased air-polluting activities of supporting businesses could result in impacts on air quality. Fuel combustion and some incidental solvent use would cause construction-related air emissions. The air pollutants would include CO, $NO_x$, $PM_{10}$, $PM_{2.5}$, $SO_2$, VOCs, $CO_2e$ or GHG emissions, $O_3$, and total HAPs. The COP provides a complete description of all emission points associated with the construction and operations stages of Phase 1, including engine sizes, hours of operation, load factors, emergency generators, emission factors, and fuel consumption rates, along with a description of the air emission calculation methodology (Volume III, Appendix B; Epsilon 2022). The total construction emissions of each pollutant for Phase 1 are summarized Table E-1, as well as in the COP (Volume III, Table 5.1-6 and Volume III, Appendix B, Table 3.2-1; Epsilon 2022). Construction equipment would use appropriate fuel-efficient engines and comply with all applicable air emission standards to keep combustion emissions and associated air quality impacts to a minimum.

Phase 1 would affect air quality through the following primary IPFs during construction, operations, and decommissioning.

**Accidental releases:** Proposed Project construction could release air toxics or HAPs due to accidental chemical spills. Phase 1 would have up to about 373,426 gallons of coolants, 591,542 gallons of oils and lubricants, and 114,638 gallons of diesel fuel in its 62 WTG foundations; and about 6,340 gallons of coolants, 355,506 gallons of oils and lubricants, and 16,402 gallons of diesel fuel in its two ESP foundations within the air quality geographic analysis area (COP Volume I, Table 3.3-6; Epsilon 2022). These may lead to short-term periods of hazardous air toxic pollutant emissions, such as VOCs through evaporation. VOC emissions would also be an important precursor to $O_3$ formation. Air quality impacts would be short term and limited to the local area at and around the accidental release location. These activities would have a **negligible** air quality impact from Phase 1.

Accidental releases would occur infrequently over the 30-year period of operations with a higher probability of spills during construction of projects, but they would not be expected to contribute appreciably to overall impacts on air quality; the total storage capacity within the air quality geographic analysis area is considerably less than the volumes of hazardous liquids being transported by ongoing activities. As a result, the Phase 1 operations would have **negligible** impacts on air quality due to accidental releases.

**Air emissions:** Emission-producing onshore activities of Phase 1 would consist of horizontal directional drilling (HDD), duct bank construction, cable-pulling operations, and substation construction. HDD emissions would be generated by operations of diesel-powered equipment (e.g., drilling rigs or other machinery). The HDD would take several weeks to complete. Duct bank construction and cable-pulling operations could take up to 8 months spread across an 18-month period (COP Volume III, Figure 3.1-3; Epsilon 2022). The applicant's voluntarily committed emission-reduction measures include fuel-efficient engines; Tier 2 or higher engines for marine diesel engines; use of ultra-low sulfur diesel fuel for some engines and 1,000 parts per million sulfur fuel in others; complying with International Maritime Organization energy-efficiency regulations; complying with applicable VOC content limits and requirements involving the use of adhesives and sealants; following smoke and opacity standards; implementing anti-idling practices; covering and securing all loose materials and construction wastes that are transported to and from the SWDA and OECC; and other emission-reducing measures to further reduce air quality impacts (Epsilon 2022). It is anticipated that emissions and the corresponding air quality impacts of Phase 1 onshore construction activities would be limited to approximately 2 years (COP Volume III, Figure 3.1-3; Epsilon 2022). Because such activities for Phase 1 would occur for short periods and be limited to combustion emissions, they would have a **negligible** impact on air quality. Other activities involving excavation, such as duct bank construction and hauling operations during cable-pulling and splicing activities, would result in combustion emissions from vehicle activity such as bulldozers, excavators, and diesel trucks, and fugitive particulate emissions from excavation and hauling of soil. These emissions would be highly variable and limited in spatial extent at any given period and would result in temporary, **minor** impacts. Fugitive particulate emissions would vary depending on the spatial extent of the excavated areas, soil type, and soil moisture content, and the magnitude and direction of ground-level winds. Fugitive emissions could be partially mitigated by imposing limits on the surface area of exposed soils in a specific area and spraying water for dust control, when possible, thereby resulting in **minor** impacts. There would be **minor** impacts from onshore construction from Phase 1.

The overall air quality impacts of offshore construction activities would continue for approximately 2 years (COP Volume III, Figure 3.1-3; Epsilon 2022). Specific emissions from potential sources or construction activities would vary throughout construction of offshore components. For pollutants such as $NO_2$, $PM_{2.5}$, and $SO_2$, the USEPA bases NAAQS attainment status on monitored 3-year pollutant concentrations. Because the construction stage of the offshore components would likely not extend past 2 years and because the emissions would vary throughout the stage, BOEM does not expect projected air quality impacts to exceed the NAAQS for these pollutants. Construction emissions from Phase 1 are shown in Table G.2.1-4 (COP Volume III, Appendix B; Epsilon 2022).

**Table G.2.1-4: Estimated Construction Emissions, Phase 1**

| | Total Emissions (tons) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Activity** | **$NO_x$** | **VOCs** | **CO** | **$PM_{10}$** | **$PM_{2.5}$** | **$SO_2$** | **HAPs** | **$CO_2e$** |
| Phase 1 construction emissions | 5,917 | 124 | 1,406 | 238 | 230 | 41 | 18 | 393,627 |

CO = carbon monoxide; $CO_2e$ = carbon dioxide equivalent; HAP = hazardous air pollutant; $NO_x$ = nitrogen oxide; $PM_{2.5}$ = articulate matter smaller than 2.5 microns; $PM_{10}$ = particulate matter smaller than 10 microns; $SO_2$ = sulfur dioxide; VOC = volatile organic compound

Both $NO_x$ and VOC are $O_3$ precursors, and these emissions may contribute to some increase in $O_3$ production during construction. There would be **minor** air quality impacts due to construction of Phase 1.

Emissions from Phase 1 offshore activities would occur during pile and scour protection installation, offshore cable laying, turbine installation, and ESP installation. Offshore activities would have more significant power requirements, resulting in a greater need for diesel-generating equipment to supply temporary power to WTGs or ESPs and other construction equipment. Offshore construction-related emissions would come from diesel generators used to temporarily supply power to the WTGs and ESPs so that workers could power up lights, controls, and other equipment before cabling is in place. There would also be emissions from engines used to power pile-driving hammers and air compressors used to supply compressed air to noise mitigation devices during pile driving (if used). Emissions from vessels used to transport workers, supplies, and equipment to and from the construction areas would result in additional air quality impacts. The proposed Project may require emergency generators at times, potentially resulting in increased emissions for limited periods.

Emissions from onshore operations activities would be limited to periodic use of construction vehicles and equipment. Onshore operations activities would include occasional inspections and repairs to the onshore substation and splice vaults, which would require minimal use of worker vehicles and construction equipment. Phase 1 intends to use port facilities at both Craigville Public Beach Landfall Site and/or Covell's Beach Landfall Site to support operations activities. Air quality impacts due to onshore operations from Phase 1 would be **minor**, occurring for short periods and temporary.

During operations, air quality impacts are anticipated to be smaller in magnitude than during construction and decommissioning. The operations stage of Phase 1 would generate fewer emissions than construction, as it would involve limited vessel and commercial traffic, and operations of emergency equipment would occur infrequently.

Operations activities would consist of WTG operations, planned maintenance, and unplanned emergency maintenance. The WTGs operating under Phase 1 would have no pollutant emissions. Emergency generators located on the WTGs and the ESPs would operate during emergencies or testing, so emissions from these sources would be temporary and **negligible**. Pollutant emissions from operations would be mostly the result of operations of ocean vessels and helicopters used for maintenance activities. Crew transfer vessels and helicopters would transport crews to the SWDA for inspections, routine maintenance, and repairs. Jack-up vessels, multipurpose offshore support vessels, and rock-dumping vessels would infrequently travel to the SWDA for significant maintenance and repairs. Table G.2.1-5 shows the estimated operations emissions for Phase 1 (COP Volume III, Appendix B; Epsilon 2022).

**Table G.2.1-5: Estimated Operations Emissions, Phase 1**

| | Annual Emissions (tons per year) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Activity** | **$NO_x$** | **VOCs** | **CO** | **$PM_{10}$** | **$PM_{2.5}$** | **$SO_2$** | **HAPs** | **$CO_2e$** |
| Phase 1 operations emissions, typical year | 178 | 3.2 | 45 | 6.0 | 5.8 | 0.5 | 0.5 | 20,259 |
| Phase 1 operations emissions, maximum year | 266 | 4.8 | 65 | 8.9 | 8.6 | 0.8 | 0.7 | 26,039 |

CO = carbon monoxide; $CO_2e$ = carbon dioxide equivalent; HAP = hazardous air pollutant; $NO_x$ = nitrogen oxide; $PM_{2.5}$ = particulate matter smaller than 2.5 microns; $PM_{10}$ = particulate matter smaller than 10 microns; $SO_2$ = sulfur dioxide; VOC = volatile organic compound

Increases in renewable energy can result in significant reductions in fossil-fuel-type emissions. Once operational, Phase 1 would result in annual avoided emissions of 1,585,878 tons of $CO_2e$, 848 tons of $NO_x$, and 450 tons of $SO_2$ (COP Volume III, Appendix B; Epsilon 2022). Accounting for construction emissions and assuming decommissioning emissions would be similar to construction emissions, the proposed Project would offset $CO_2e$ emissions related to its development and eventual decommissioning within the first year of operations; from that point, the proposed Project would offset emissions that would otherwise be generated from another source. Offshore operations activities would have a **minor** beneficial air quality impact as a result of Phase 1.

For onshore decommissioning activities, the proposed Project would remove onshore export cables from the duct bank using truck-mounted winches, cable reels, and cable reel transport trucks. The proposed Project could leave the concrete-encased duct bank and splice vaults in place for future reuse, as well as elements of the onshore substation and grid connections. Consequently, onshore decommissioning emissions would be significantly less than onshore construction emissions. There would be **minor** and temporary air quality impacts from Phase 1 due to decommissioning.

**Climate change:** Phase 1 and other future offshore wind projects would produce GHG emissions (nearly all $CO_2$) that contribute to climate change; however, these contributions would be minimal compared to aggregate global emissions and less than the emissions offset during operations of the offshore wind facility. $CO_2$ is relatively stable in the atmosphere and for the most part 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 could reduce regional GHG emissions by displacing energy from fossil fuels. This reduction could more than offset the relatively small GHG emissions from offshore wind projects. This reduction in regional GHG emissions would be noticeable in the regional context, would contribute incrementally to reducing climate change, and would represent a moderate beneficial impact in the regional context but a negligible beneficial impact in the global context. The additional GHG emissions anticipated from the planned activities, including Phase 1, over the next 30-year period would have a negligible incremental contribution to climate change. Therefore, Phase 1 would have **negligible** impacts on climate change during these activities and an overall **minor** beneficial impact on both GHG emissions and criteria pollutants, including $O_3$ precursors like $NO_x$, compared to a similarly sized fossil-fuel power-generating station or the generation of the same amount of energy by the existing grids. Because GHG emissions spread out and mix within the troposphere, the climatic impact of GHG emissions does not depend upon the source location. Therefore, regional climate impacts are likely a function of global emissions.

As shown in Table G.2.1-5, operations of Phase 1 would produce $CO_2e$ emissions that that contribute to climate change, although these contributions would be minuscule compared to aggregate global emissions. Operations of Phase 1 would also reduce or avoid $CO_2e$ emissions from fossil-fuel power generation. As a result, Phase 1 operations would have **negligible** impacts with respect to climate change due to $CO_2e$ emissions, as well as **negligible** beneficial impacts due to fossil fuel $CO_2e$ emissions avoided or prevented.

### *Impacts of Phase 2*

The air emission sources during construction of Phase 2 would be similar to those in Phase 1 of the proposed Project. If the applicant includes the South Coast Variant (SCV) as part of the final proposed Project design, some or all of the impacts on air quality from the Phase 2 OECC through Muskeget Channel would not occur. [1] BOEM will provide a more detailed analysis of the SCV impacts and the Phase 2 OECC on air quality in a supplemental NEPA analysis. The volumes and impacts of Phase 2 emissions are discussed below.

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[1] The applicant would be required to notify BOEM of a COP revision pursuant to 30 CFR § 585.634 if the applicant determines the SCV is necessary.

The COP provides a complete description of all emission points associated with the construction and operations stages of Phase 2, including engine sizes, hours of operation, load factors, emergency generators, emission factors, and fuel consumption rates, along with a description of the air emission calculation methodology (Volume III, Appendix B; Epsilon 2022). The total construction emissions of each pollutant for Phase 2 are summarized Table G.2.1-6, as well as in the COP (Volume III, Table 5.1-7 and Volume III, Appendix B, Table 3.3-1; Epsilon 2022).

**Accidental releases:** Phase 2 could release HAPs because of accidental chemical spills. Phase 2 would have up to about 409,564 gallons of coolants, 648,788 gallons of oils and lubricants, and 125,732 gallons of diesel fuel in its 68 WTG foundations; and about 9,510 gallons of coolants, 533,334 gallons of oils and lubricants, and 24,608 gallons of diesel fuel in its three ESP foundations within the air quality geographic analysis area (COP Volume I, Table 4.3-7; Epsilon 2022). Air quality impacts would be short term and limited to the local area at and around the accidental release location. These activities would have a **negligible** air quality impact as a result of Phase 2. The change in risk to, or impact on, air quality in the air quality geographic analysis area due to offshore wind development is small. The frequency of accidental release events would be small. If an accidental release occurs, it is anticipated that the overall air quality impact would be short term and spatially limited. Collectively, there would be about 1.3 million gallons of coolants, 5.1 million gallons of oils and lubricants, and 715,955 gallons of diesel fuel contained within the 700 foundations from Phase 2 and future planned activities in the air quality geographic analysis area. Impacts from accidental releases during construction from the SCV would be similar to those impacts discussed for Phase 1 but would occur in Bristol County, Massachusetts.

**Air emissions:** Onshore activities of Phase 2 would be similar to those of Phase 1 and consist of HDD, duct bank construction, cable-pulling operations, and substation construction. The applicant would commit to the same emission-reducing measures as described for Phase 1. It is anticipated that emissions and the corresponding air quality impacts of onshore construction activities would be limited to approximately 2 years. Because such activities for Phase 2 would occur for short periods and be limited to combustion emissions, they would have a **negligible** impact on air quality. Fugitive emissions could be partially mitigated by imposing limits on the surface area of exposed soils in a specific area and spraying water for dust control, when possible, thereby resulting in **minor** impacts. There would be **minor** impacts from onshore construction from Phase 2.

Phase 2 would contribute up to 531,441 tons of construction emissions, which would be additive with the impacts of all other construction activities, including future offshore wind activities, that occur within the air quality geographic analysis area before the resource has recovered from the impact caused by the proposed Project. Table G.2.1-6 shows the estimated construction emissions for Phase 2 (COP Volume III, Appendix B; Epsilon 2022).

**Table G.2.1-6: Estimated Construction Emissions, Phase 2**

| Activity | Total Emissions (tons) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $NO_x$ | VOCs | CO | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | HAPs | $CO_2e$ |
| Phase 2 construction emissions | 7,732 | 164 | 1,841 | 339 | 329 | 54 | 24 | 520,958 |

CO = carbon monoxide; $CO_2e$ = carbon dioxide equivalent; HAP = hazardous air pollutant; $NO_x$ = nitrogen oxide; $PM_{2.5}$ = particulate matter smaller than 2.5 microns; $PM_{10}$ = particulate matter smaller than 10 microns; $SO_2$ = sulfur dioxide; VOC = volatile organic compound

Both $NO_x$ and VOC are $O_3$ precursors, and these emissions may contribute to some increase in $O_3$ production during construction. There would be **minor** air quality impacts due to the construction of Phase 2. The emission sources for Phase 2 offshore activities would be the same sources as for Phase 1.

Emissions from operations activities would be similar to those in Phase 1 and limited to periodic use of construction vehicles and equipment. During operations, air quality impacts are anticipated to be smaller in magnitude compared to construction and decommissioning. Operations of Phase 2 would generate fewer emissions than construction since they would involve limited vessel and commercial traffic, and operations of emergency equipment would occur infrequently. Air quality impacts due to onshore operations from Phase 2 would be temporary and **minor**, occurring only when maintenance vessels or vehicles are used.

The change in risk to, or impact on, air quality in the geographic analysis area due to offshore wind development is small, and the frequency of accidental release events would also be small. If a release were to occur, it is anticipated that the overall air quality impact would be short term and spatially limited.

The COP provides a more detailed description of offshore and onshore operations activities for Phase 2 (Volume I; Epsilon 2022) and summarizes emissions during operations (COP Volume III, Appendix B, Table 3.3-2; Epsilon 2022). Operations activities would be similar to those in Phase 1 and include WTG operations, planned maintenance, and unplanned emergency maintenance.
Table G.2.1-7 shows the estimated operations emissions for Phase 2 (COP Volume III, Appendix B; Epsilon 2022).

**Table G.2.1-7: Estimated Operations Emissions, Phase 2**

| Activity | Annual Emissions (tons per year) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $NO_x$ | VOCs | CO | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | HAPs | $CO_2e$ |
| Phase 2 operations emissions, typical year | 179 | 3.2 | 45 | 6.0 | 5.8 | 0.5 | 0.5 | 27,594 |
| Phase 2 operations emissions, maximum year | 270 | 4.9 | 67 | 9.0 | 8.7 | 0.9 | 0.7 | 33,606 |

CO = carbon monoxide; $CO_2e$ = carbon dioxide equivalent; HAP = hazardous air pollutant; $NO_x$ = nitrogen oxide; $PM_{2.5}$ = particulate matter smaller than 2.5 microns; $PM_{10}$ = particulate matter smaller than 10 microns; $SO_2$ = sulfur dioxide; VOC = volatile organic compound

Increases in renewable energy can result in significant reductions in fossil-fuel-type emissions. Once operational, Phase 2 would result in annual avoided emissions of 2,345,191 tons of $CO_2e$, 1,255 tons of $NO_x$, and 666 tons of $SO_2$ (COP Volume III, Appendix B; Epsilon 2022). Accounting for construction emissions, and assuming decommissioning emissions would be similar to the construction stage, the proposed Project would offset $CO_2e$ emissions related to its development and eventual decommissioning within the first year of operation; from that point, offsetting emissions would be otherwise generated from another source.

Similar to Phase 1, onshore decommissioning activities of Phase 2 would have substantially lower emissions than onshore construction. There would be **minor** and temporary air quality impacts from Phase 2 due to decommissioning. Air emission impacts from operations and decommissioning of the SCV would be similar to those impacts discussed under Phase 1.

**Climate change:** Impacts on climate change from Phase 2 construction would be similar to those in Phase 1. Therefore, Phase 2 construction would have **negligible** impacts on climate change and an overall **minor** beneficial impact on GHG emissions and criteria pollutants compared to a similarly sized fossil-fuel power-generating station or the generation of the same amount of energy by the existing grids. Impacts on climate change from construction of the SCV would be similar to those in Phase 1.

### *Cumulative Impacts*

Offshore construction overlap between Phase 1 and planned offshore wind projects would begin in 2023 based on the lease areas within the air quality geographic analysis area (Table E-1). As Alternative B and other future offshore wind projects come online, power generation emissions in the region would reduce emissions over time, and this would contribute to a net benefit on air quality regionally. Most air quality impacts would remain offshore since the highest emissions would occur in this region, and the westward prevailing winds would result in most plumes remaining offshore.

The cumulative impacts of Alternative B considered the impacts of Alternative B in combination with other ongoing and planned wind activities. Ongoing and planned non-offshore wind activities described in Table G.1-14 in Appendix G would contribute to impacts on air quality through the primary IPFs of air emissions and climate change. These impacts would primarily occur through changes emissions of air pollutants and $CO_2e$. Cumulative impacts on air quality would range from **negligible** to **minor**, as well as **minor** beneficial. Adverse impacts would occur due to increased emissions, while beneficial impacts would occur due to the offset of GHG emissions from fossil-fuel power plants due to the use of offshore wind energy.

### *Conclusions*

**Impacts of Alternative B.** Alternative B would have **minor** impacts and **minor** beneficial impacts on air quality within the geographic analysis area based on all IPFs. Air quality in the geographic analysis area may be impacted by the emission of criteria pollutants from sources involved in construction or operations of the proposed Project. These impacts, while generally localized to the emission source in question, may occur at any location associated with the proposed Project, be it offshore in the SWDA or at any of the onshore construction or support sites. Additionally, $O_3$ levels in the region could potentially be impacted.

The majority of air emissions from Alternative B would come from vessels, engines on construction equipment, aircraft (e.g., helicopters), generators, on-road vehicles, and some fugitive emissions during the construction, operations, and decommissioning stages. Fugitive emissions would occur from excavation and hauling soil. A net benefit in air quality is expected as Alternative B comes online and offsets emissions from fossil-fuel-type sources. Because total actual fossil-fuel emissions are much higher than total actual emissions due to renewable energy sources, a relatively small percentage reduction in fossil-fuel emissions can lead to much larger emissions reductions relative to the smaller emission increases that would result from implementation of offshore wind projects.

Although Alternative B would generate some air quality impacts due to various activities associated with construction, maintenance, and eventual decommissioning, these emissions would be relatively small and limited in duration. BOEM could reduce potential impacts by requiring the use of dust control plans for onshore construction areas as a condition of COP approval (EIS Appendix H, Mitigation and Monitoring). The potential impacts from construction activities and the operations of the various vehicles, sea vessels, and temporary power-generating and maintenance equipment would be further reduced if the potential mitigation and monitoring measures related to dust control plans outlined in EIS Appendix H became a condition of COP approval.

**Cumulative Impacts of Alternative B.** The cumulative impacts on air quality in the geographic analysis area would be **minor** and **moderate** beneficial**.** The main driver for this impact rating is air emissions related to construction activities increasing commercial vessel traffic, air traffic, public vehicular traffic, combustion emissions from construction equipment, and fugitive emissions, which would be higher during overlapping construction activities but short term in nature as the overlap would be limited. Alternative B would contribute to the overall impact rating primarily through short-term construction emissions from construction vessels. Overall, Alternative B would result in a net decrease in overall emissions over the region compared to the installation of a traditional fossil-fuel power-generating station.

**Impacts of Alternative C – Habitat Impact Minimization Alternative on Air Quality**

Alternatives C-1 and C-2 would not affect the number or placement of WTGs or ESPs for the proposed Project compared to Alternative B. Alternatives C-1 and C-2 would alter the exact routes of inter-array, inter-link, and export cables installed for the proposed Project, and could, thus, affect the exact length of cable installed and area of ocean floor disturbed or the exact location of construction or maintenance vessel activity. These differences would not result in meaningfully different impacts compared to Alternative B. Therefore, the impacts of Alternatives C-1 and C-2 on air quality would be the same as those for Alternative B.

## G.2.2 Water Quality

### G.2.2.1 Description of the Affected Environment

This section discusses existing water quality in the geographic analysis area, as described in Table D-1 in EIS Appendix D, Geographical Analysis Areas, and shown on Figure G.2.2-1. This is defined as a 10-mile radius around the SWDA, the OECC, and vessel routes to/from the port facilities. Table G.1-15 describes existing conditions and, based on IPFs assessed, the impacts on water quality of ongoing and planned activities other than offshore wind, which is discussed below.

Detailed descriptions of existing conditions for onshore and offshore water quality can be found in the COP (Section 5.2, Volume III; Epsilon 2022), as well as the *Vineyard Wind 1 Offshore Wind Energy Project Final Environmental Impact Statement* (BOEM 2021a), for which the analysis area overlaps with much of the geographic analysis area for the proposed Project. These regional descriptions remain valid and are briefly summarized in this section. Key water quality parameters are presented in Table G.2.2-1, including mean observed values from 2010 to 2020 in Nantucket Sound for three data buoys from the available data in Center for Coastal Studies (2020) dataset.

**Table G.2.2-1: Water Quality Parameters with Characterizing Descriptions and Mean Ranges from Three Data Buoys in Nantucket Sound (2010 to 2020)**

| Parameter | Characterizing Description | Mean Ranges |
|---|---|---|
| Temperature | Water temperature heavily affects species distribution in the ocean. Large-scale changes to water temperature may impact seasonal phytoplankton blooms, an important part of New England marine ecosystems (Oviatt 2004). | 18.0–20.3°C |
| Salinity | Salinity, or salt concentration, also affects species distribution. Seasonal variation is smaller than year-to-year variation and less predictable than temperature changes (Kaplan 2011). | 31.5–31.7 practical salinity units |
| Dissolved oxygen | Dissolved oxygen concentrations should be above 5 mg/L to maintain a stable environment; lower levels may affect sensitive organisms (USEPA 2000). | 7.3–8.0 mg/L |
| Chlorophyll a | Chlorophyll a is an indicator of primary productivity. The USEPA considers estuarine and marine levels of chlorophyll a under 5 µg/L to be good, 5 to 20 µg/L to be fair, and over 20 µg/L to be poor (USEPA 2021a). | 2.0–2.3 mg/L |
| Turbidity | Turbidity is a measure of water clarity. High turbidity reduces light penetration, reduces ecological productivity, and provides attachment places for other pollutants (USGS 2018). | 0.6–0.8 nephelometric turbidity units |
| Total nitrogen and Total phosphorous | Phytoplankton (the foundation of the marine food chain) growth rates depend on nutrient availability in the water. Nutrient sources within the geographic analysis area include recycling or resuspension from sediments, river and stream discharges, transport into the area from offshore waters, atmospheric deposition, and upwelling from deeper waters (COP Section 5.2.1, Volume III; Epsilon 2022). | 10.2–12.7 µM<br>0.7–0.9 µM |

Source: Center for Coastal Studies 2020

°C = degrees Celsius; µg/L = micrograms per liter; COP = Construction and Operations Plan; mg/L = milligrams per liter; USEPA = U.S. Environmental Protection Agency

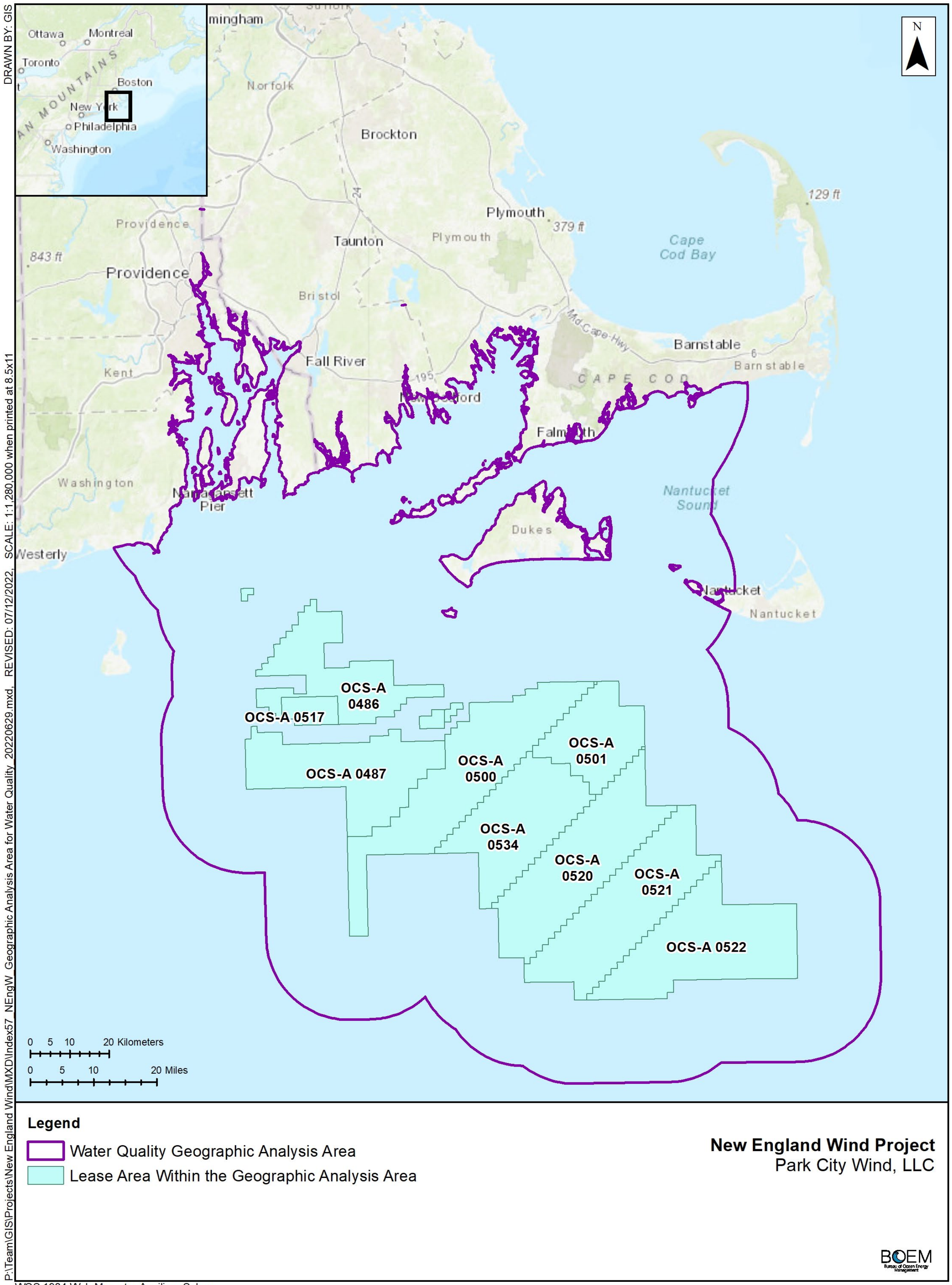


**Figure G.2.2-1: Geographic Analysis Area for Water Quality**

Weather-driven surface currents, tidal mixing, and estuarine outflow all contribute to driving water movement through the area (Kaplan 2011) with large-scale regional water circulation (clockwise movement from Georges Bank toward the equator) being the strongest in the late spring and summer (Gulf of Maine Census 2018).

The proposed Project may use the following ports: the Port of New Bedford, Brayton Point Commerce Center, Fall River terminal facilities, Vineyard Haven Harbor, and the Salem Offshore Wind Port in Massachusetts; the Port of Bridgeport and Port of New London in Connecticut; the Paulsboro Marine Terminal in New Jersey; the Port of Albany Beacon Island expansion, Port of Coeymans, GMD Shipyard, South Brooklyn Marine Terminal, New York State Offshore Wind Port, Homeport Pier, Arthur Kill Terminal, Shoreham site, and Greenport Harbor in New York; and the Port of Providence (ProvPort), South Quay Terminal, and Port of Davisville in Rhode Island (EIS Section G.2.7, Land Use and Coastal Infrastructure). These ports are located within protected embayments and urban estuaries. These nearshore and inshore bodies of water typically have worse water quality conditions than waters farther offshore (e.g., in Buzzards Bay or Nantucket Sound) due to groundwater discharge, which results in nutrient pollution and other water quality issues. Inner New Bedford Harbor was given a score of 43 (Fair) out of 100 in the Buzzards Bay Coalition's Bay Health Index score, which combines water turbidity, nitrogen levels, dissolved oxygen concentration, and algae content. Outer New Bedford Harbor had a score of 56 (Fair) (Buzzards Bay Coalition 2021). Nutrient overloading in estuaries and coastal waters goes back several decades with increases in coastal development (approximately 80 percent of which is due to groundwater contamination by septic systems) and boat traffic (Cape Cod Commission 2013). Both development and increased boat traffic contribute to other contaminant levels, and these would continue regardless of the offshore development.

Additionally, climate change (warming sea temperatures, rising sea levels, ocean acidification, etc.) can affect water quality, causing variability within the ecosystem. Regional ocean temperatures have warmed faster than the global ocean over the last 2 decades, especially in the Gulf of Maine (NOAA 2021). This long-term temperature change is forced by the warming of source waters flowing into the region rather than by local atmospheric forcing (Shearman and Lentz 2010).

The USEPA monitors water quality trends over time through a national coastal condition assessment. This assessment establishes a water quality index to describe the water quality of various coastal areas by assigning three condition levels (good, fair, and poor) for several water quality parameters. Table G.2.2-2 lists the USEPA Region 1 condition levels per parameter from 2005, 2010, and 2015 (USEPA 2021b); Region 1 includes the coastal waters in the geographic analysis area. Overall, coastal water quality is in good condition. Since 2005, the percentage of "good" ratings has increased for all of the parameters analyzed, although dissolved phosphorus "good" ratings dipped in 2010 before increasing in 2015.

**Table G.2.2-2: Water Quality Index for the U.S. Environmental Protection Agency Region 1 Stations based on Data Collected in 2005, 2010, and 2015**

| | 2005 | | | 2010 | | | 2015 | | |
|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Other[a]** | **Good** | **Fair** | **Other[a]** | **Good** | **Fair** | **Other[a]** | **Good** | **Fair** |
| Dissolved oxygen | 62.1 % | 8.0% | 29.9% | 86.6% | 7.6% | 5.8% | 88.4% | 4.8% | 6.8% |
| Chlorophyll a | 65.7% | 9.4% | 24.9% | 86.7% | 10.0% | 3.3% | 94.2% | 5.8% | 0% |
| Water clarity | 66.9% | 1.0% | 32.1% | 97.6% | 0% | 2.4% | 99.6% | 0.2% | 0.2% |
| Dissolved nitrogen | 74.2% | 2.3% | 23.5% | 94.0% | 5.8% | 0.2% | 99.7% | 0.3% | 0% |
| Dissolved phosphorous | 17.4% | 52.3% | 30.3% | 14.7% | 82.3% | 3.0% | 40% | 51.9% | 8.1% |

Source: USEPA 2021b
[a] This includes water quality stations that recorded "poor" values, or for which data were not available.

#### G.2.2.2 Environmental Consequences

Definitions of impact levels for water quality are described in Table G.2.2-3. There are no beneficial impacts on water quality.

**Table G.2.2-3: Impact Level Definitions for Water Quality**

| Impact Level | Impact Level | Definition |
|---|---|---|
| Negligible | Adverse | Changes would be undetectable. |
| Minor | Adverse | Changes would be detectable but would not result in degradation of water quality in exceedance of water quality standards. |
| Moderate | Adverse | Changes would be detectable and would result in localized, short-term degradation of water quality in exceedance of water quality standards. |
| Major | Adverse | Changes would be detectable and would result in extensive, long-term degradation of water quality in exceedance of water quality standards. |

### Impacts of Alternative A – No Action Alternative on Water Quality

When analyzing the impacts of Alternative A on water quality, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the existing conditions for air quality infrastructure (Table G.1-15). The cumulative impacts of Alternative A considered the impacts of Alternative A in combination with other planned non-offshore wind and offshore wind activities, as described in EIS Appendix E, Planned Activities Scenario.

Under Alternative A, existing conditions for water quality described in Section G.2.2.1 would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing and planned activities within the geographic analysis area that affect water quality include onshore development activities (including urbanization, forestry practices, municipal waste discharges, and agriculture), marine transportation-related discharges, dredging and port improvement projects, commercial fishing, military use, new submarine cables and pipelines, and climate change. These activities would continue regardless of the offshore development over the proposed 30-year Project period and are expected to continue on existing trends based on the current regulations in place. Impacts on water quality from ongoing and planned non-offshore wind actions would still occur, but the exact impact depends on the temporal and geographical nature of activities and associated IPFs.

Ongoing offshore wind activities within the geographic analysis area that contribute to impacts on water quality include construction, operation, and decommissioning of the Vineyard Wind 1 project in Lease Area OCS-A 0501 and the South Fork Wind project in Lease Area OCS-A 0517, as well as other ongoing offshore wind projects that use Massachusetts ports in and near New Bedford, Brayton Point, Fall River, and Vineyard Haven. Ongoing and planned activities (including offshore wind) would affect land use and coastal infrastructure through the primary IPFs described below.

***Cumulative Impacts***

The nature, extent, frequency, duration, and intensity of various IPFs and their associated impacts from future offshore wind activities other than the proposed Project have been detailed in the Final EIS for Vineyard Wind 1 Project (Vineyard Wind 1) (BOEM 2021a). That analysis is also applicable to the present assessment. The cumulative impact analysis for Alternative A considers the impacts of Alternative A in combination with other planned non-offshore wind activities and planned offshore wind activities (other than Alternative B). The following section summarizes BOEM's findings (2021a) and updates them to the extent that new information is available. Future offshore wind activities would affect water quality through the following primary IPFs.

**Accidental releases**: Future offshore wind activities could expose coastal and offshore waters to contaminants (such as fuel; sewage; solid waste; or chemicals, solvents, oils, or grease from equipment) in the event of a spill or release during routine vessel use, collisions and allisions, or equipment failure of a WTG or ESP. 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 U.S. Coast Guard (USCG) and Bureau of Safety and Environmental Enforcement (BSEE). Oil spill response plans (OSRP) are required for every project and would provide for rapid spill response, clean-up, and other measures that would help to minimize potential impacts on affected resources from spills. BOEM assumes all projects and activities would comply with laws and regulations to minimize releases.

Vessel activity would increase during construction, and, thus, would increase the potential for vessel allisions/collisions and fuel spills. The probability of a fuel spill would be minimized by preventative measures, such as onboard containment measures and OSRPs, during routine vessel operations, including fuel transfer. The extent and persistence of water quality impacts from a fuel spill would depend on the meteorological and oceanographic conditions at the time and the effectiveness of spill response measures.

Using the assumptions in Table E-1, approximately 1.0 million gallons of coolants, 4.6 million gallons of oils and lubricants, and 703,850 gallons of diesel fuel would be contained in the 724 foundations (WTGs and ESPs) for the wind energy projects (other than the proposed Project) within the water quality geographic analysis. Other chemicals, including grease, paints, and sulfur hexafluoride, would also be used at the offshore wind projects, and black and gray water may be stored on facilities. BOEM has conducted extensive modeling to determine the likelihood and impacts of a chemical spill at offshore wind facilities (Bejarano et al. 2013). The modeling effort revealed the most likely type of spill to occur is from the WTGs at a volume of 90 to 440 gallons, at a rate of one time in 1 to 5 years, or a diesel fuel spill of up to 2,000 gallons at a rate of one time in 20 years. The likelihood of a spill occurring from multiple WTGs and ESPs at the same time is very low and, therefore, the potential impacts from a spill larger than 2,000 gallons are largely discountable. The likelihood of a catastrophic, or maximum-case scenario, release of all oils and chemicals would be very low (Bejarano et al. 2013).

The use of heavy equipment onshore could result in potential spills during use or refueling activities. Onshore construction activities and associated equipment would involve fuel and lubricating and hydraulic oils.

Trash and debris accidently released into the marine environment can harm marine animals through entanglement and ingestion. Vessel operators will adhere to the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) Annex V requirements, USEPA and USCG regulations, and BSEE regulations.

An accidental release would generally be localized, short term, and result in little change to water quality. In the unlikely event a large spill occurred, impacts on water quality would be 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 spill location, as well as the effectiveness of spill response measures. Due to the low likelihood of a spill occurring and the expected size of the most likely spill, the overall impact of accidental releases would be short term and localized, resulting in little change to water quality (BOEM 2021a). As such, accidental releases from future offshore wind development would not contribute appreciably to overall impacts on water quality.

**Anchoring and gear utilization**: Anchoring associated with future wind development could contribute to changes in water quality through resuspension of sediments during construction, operations, and decommissioning. Disturbances to the seabed during anchoring would temporarily increase suspended sediment and turbidity levels in and immediately adjacent to the anchorage area. Due to the current ambient conditions and the localized area of disturbances around each of the individual anchors, the overall impact of increased sediment and turbidity from vessel anchoring would be localized and short term, resulting in little change to ambient water quality (BOEM 2021a). Therefore, anchoring and gear utilization would not appreciably contribute to overall impacts on water quality.

**Cable emplacement and maintenance**: Using the assumptions in Table E-1, cable emplacement from future offshore wind development other than the proposed Project would result in seabed disturbance of about 7,510 acres. This would result in increased suspended sediments and turbidity. The sediment dispersion model for the proposed Project used several simulations for possible cable installation methods and predicted the sediment plume would be located in approximately the bottom 20 feet of the water column. Above-ambient total suspended solids (TSS) was predicted to stay within 656 feet of the cable but could possibly extend 1.3 to 1.4 miles; elevated TSS persisted for less than 4 hours. Future offshore wind projects would use dredging only when necessary and rely on other cable laying methods for reduced impacts (i.e., jet or mechanical plow), where feasible. Due to the current ambient conditions, localized areas of disturbances, and range of variability within the water column, the overall impacts of increased sediments and turbidity from cable emplacement and maintenance would be localized and short term, resulting in little change to ambient water quality. The impacts of periodic cable maintenance on water quality would be similar to those described for cable emplacement but would be more localized (i.e., affecting only the segment of cable being maintained). Cable emplacement and maintenance activities would not appreciably contribute to overall impacts on water quality.

**Discharges/intakes**: WTGs and ESPs are typically self-contained and do not generate discharges under normal operating conditions. Future offshore wind projects would result in a small incremental increase in vessel traffic, with a short-term peak during construction. Vessel activity associated with future offshore wind project construction is expected to occur regularly in the Rhode Island and Massachusetts Lease Areas (RI/MA Lease Areas) beginning in 2022 and continuing through 2030 and then lessen to near-existing condition levels during operations. Increased vessel traffic would be localized near affected ports and offshore construction areas. Future offshore wind development would result in an increase in regulated discharges from vessels, particularly during construction and decommissioning, but the events would be staggered over time and localized. Offshore permitted discharges would include uncontaminated bilge water and treated liquid wastes. BOEM assumes that all vessels/facilities operating in the same area will comply with federal and state regulations on effluent discharge including the requirement of a USEPA National Pollutant Discharge Elimination System (NPDES) permit. All future offshore wind projects would be required to comply with regulatory requirements related to the prevention and control of discharges and the prevention and control of non-indigenous species. All vessels would need to comply with USCG ballast water management requirements outlined in 33 Code of Federal Regulations, Title 33, Part 151 (33 CFR Part 151) and 46 CFR Part 162. Furthermore, each project's vessels would need to meet USCG bilge water regulations outlined in 33 CFR Part 151, and allowable vessel discharges, such as bilge and ballast water, would be restricted to uncontaminated or properly treated liquids. Therefore, due to the minimal amount of allowable discharges from vessels associated with future offshore wind projects, impacts on water quality resulting from vessel discharges would be minimal and to not exceed background levels over time.

Due to the staggered increase in vessels from various projects; the current regulatory requirements administered by the USEPA, the U.S. Army Corps of Engineers (USACE), USCG, and BSEE; and the restricted allowable discharges; the overall impacts of discharges from vessels would be localized and short term. Based on the above, the level of impact in the water quality geographic analysis area from future offshore wind development would be similar to existing conditions and would not appreciably contribute to overall impacts on water quality.

Other offshore wind projects in the RI/MA Lease Areas may include high-voltage direct current (DC) export cables. The process of converting alternating current (AC) to DC generates substantial amounts of heat, and the conversion equipment requires cooling systems (often installed as stand-alone structures similar to an ESP) to avoid overheating (BOEM 2022c). Where high-voltage DC closed loop cooling systems are installed, sea water may be used for heat exchange. Ambient-temperature seawater is pumped into and absorbs heat from the high-voltage DC conversion process before being discharged into the ocean, where that heat is absorbed and dissipated (BOEM 2022c). The warmer outflow from high-voltage DC is “generally accepted as a minimal effect” (BOEM 2022c), and any such discharges must be permitted through the USEPA’s NPDES (BOEM 2022c). These impacts would be long term and localized to the area around high-voltage DC conversion systems and would not appreciably contribute to overall impacts on water quality.

**Land disturbance**: Future wind development could include onshore components that could contribute to water quality impacts through sedimentation and accidental spills of fuels and lubricants during construction. BOEM assumes that each project would avoid and minimize water quality impacts through best management practices (BMP); spill prevention, control, and countermeasure plans; stormwater pollution prevention plans; and compliance with applicable permit requirements. Overall, the impacts from onshore activities that occur near waterbodies could result in temporary introduction of sediments or pollutants fluids into coastal waters in small amounts where erosion and sediment controls fail. Land disturbance for future offshore wind developments that are at a distance from waterbodies and that implement erosion and sediment control measures would be less likely to affect water quality. Impacts on water quality would be localized, short term, and limited to periods of onshore construction and periodic maintenance over the life of each project. Land disturbance from future offshore wind development would not appreciably contribute to overall impacts on water quality.

**Port utilization**: Future wind development could increase port utilization, possibly including port expansion/modification, resulting in increased potential for increased turbidity, sedimentation, and accidental releases (fuel spills, trash/debris, etc.). However, any port expansions/modifications would comply with all applicable permit requirements, and vessels would adhere to all USCG and MARPOL 73/78 Annex V requirements and, as applicable, the NPDES vessel general permit. Due to construction timeframes and decreased vessel traffic during operations, the overall impact of accidental spills and sedimentation during port utilization would be localized and short to long term, resulting in little change to water quality. Port utilization would not appreciably contribute to overall impacts on water quality.

**Presence of structures**: Using the assumptions in Table E-1, future offshore wind development other than the proposed Project would result in 724 structures in the water, 6,981 acres of impact from installation of foundations and scour protection, and 1,095 acres of impact from hard protection for the offshore export, inter-array, and inter-link cables. These structures would result in some alteration of local water current leading to increased movement, suspension, and deposition of sediments, but significant scour is not expected in deep water locations (areas without tidally dominated currents), where most of the structures would be located. Scouring that leads to impacts on water quality through the formation of sediment plumes generally occurs in shallow areas with tidally dominated currents (Harris et al. 2011). Structures may reduce wind-forced mixing of surface waters, whereas water flowing around the foundations may increase vertical mixing. Results from a recent BOEM (2021b) hydrodynamic model (HDM) of four different WTG buildout scenarios of the offshore RI/MA Lease Areas found that offshore wind projects have the potential to alter local and regional physical oceanic processes (e.g., currents, temperature stratification) via their influence on currents from WTG foundations and by extracting energy from the wind. The results of the HDM study show that introduction of the offshore wind structures into the offshore area modifies the oceanic responses of current magnitude, temperature, and wave heights by reducing the current magnitude through added flow resistance, influencing the temperature stratification by introducing additional mixing, and reducing current magnitude and wave height by extracting of energy from the wind by the turbines. The changes in currents and mixing would fluctuate seasonally and regionally and affect water quality parameters (e.g., temperature, dissolved oxygen, and salinity).

Without protective measures, the exposure of offshore wind structures, which are mainly made of steel, to the marine environment can result in corrosion. Corrosion is a general problem for offshore infrastructure, and corrosion protection systems are necessary to maintain 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. For example, galvanic anodes can emit metals such as aluminum, zinc, and indium, and organic coatings can release organic compounds due to weathering and/or leaching. The current understanding of chemical emissions for offshore wind structures is that emissions appear to be small, suggesting a low environmental impact, especially compared to other offshore activities. These emissions may become more relevant for the marine environment with increased numbers of offshore wind projects (Kirchgeorg et al. 2018).

Overall impacts on water quality from future offshore wind activities would be localized and could be recurring for the life of the structures. Presence of structures would not appreciably contribute to overall impacts on water quality.

***Conclusions***

**Impacts of Alternative A.** Under Alternative A, water quality would continue to follow current regional trends and respond to current and future environmental and societal activities. While the proposed Project would not be built under Alternative A, ongoing activities would have continuing impacts primarily through accidental releases and discharges/intakes. Considering all the IPFs together, the water quality impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities would be **minor** to **moderate**. BOEM has considered the possibility of impacts resulting from accidental releases. A **moderate** impact could occur if there was a large-volume, catastrophic release; however, the probability of this occurring is very low.

**Cumulative Impacts of Alternative A.** In addition to ongoing activities, planned activities may also contribute to impacts on water quality, primarily through accidental releases and discharges/intakes. The combination of ongoing activities and planned activities other than offshore wind would result in **minor** to **moderate** impacts on water quality. Considering all the IPFs together, the overall impacts of Alternative A would result in **minor** impacts on water quality due primarily to accidental releases and discharges/intakes. A **moderate** impact could occur if there was a large-volume, catastrophic release; however, the probability of this occurring is very low.

**Relevant Design Parameters and Potential Variances in Impacts**

The primary proposed Project design parameters that would influence the magnitude of the impacts on water quality include the following:

- The extent of vessel use during construction, operations, and decommissioning;
- The number of WTGs and ESPs and the amount of cable laid, which determines the area of seafloor and volume of sediment disturbed by installation;
- Installation methods and installation duration;
- Proximity to sensitive groundwater or surface water sources and mitigation and monitoring measures used for onshore proposed Project activities; and
- The quantity and type of oil, lubricants, chemicals, or other trash/debris contained in the WTGs, vessels, and other proposed Project equipment in the event of a non-routine event, such as a spill.

### Impacts of Alternative B – Proposed Action on Water Quality

This section identifies potential impacts of Alternative B on water quality.

#### *Impacts of Phase 1*

Phase 1 would affect water quality through the following primary IPFs during construction, operations, and decommissioning.

The water quality impacts from the presence of structures during Phase 1 operations are discussed below. Phase 1 operations would be similar to, but less extensive than, construction for IPFs related to accidental releases, anchoring and gear utilization, cable emplacement and maintenance, discharges, and port utilization. Vessel activity would be significantly less during operations than construction, decreasing the frequency of anchoring and port utilization, and reducing the likelihood of accidental releases and discharges. Cable maintenance impacts for operations would be similar to those described for construction but would be limited to individual cable sections being maintained or repaired. The WTGs and ESPs are self-contained and do not generate discharges under normal operating conditions. The mitigation and monitoring measures listed for Phase 1 construction (EIS Appendix H, Mitigation and Monitoring) would be followed during Phase 1 operations, limiting the impacts on water quality. Phase 1 operations would not generate any land disturbance under normal operating conditions.

**Accidental releases**: Accidental releases during construction could involve fuel, oil, and lubricants. Each Phase 1 WTG would store up to 6,023 gallons of coolant, 9,547 gallons of oils and lubricants, and 1,849 gallons of diesel fuel, while each ESP would store 2,113 gallons of coolant, 118,616 gallons of oils and lubricants, and 5,468 gallons of diesel fuels (COP Volume I, Table 3.3-6; Epsilon 2022). The risk of a spill from any single offshore structure would be low, and any impacts would likely be localized. Increased vessel activity during construction would increase the potential for vessel allisions/collisions and fuel spills. However, collisions and allisions would be unlikely based on USCG requirement for lighting on proposed Project vessels, vessel speed restrictions, the proposed spacing of WTGs and the ESPs, the implementation of a USCG-approved lighting and marking plan, and the inclusion of proposed Project components on navigation charts (EIS Appendix H). The applicant would implement and adhere to its OSRP (COP Appendix I-F, Volume I; Epsilon 2022), which would provide for rapid spill response, cleanup, and other measures to minimize any potential impact on affected resources from spills and accidental releases, including spills resulting from catastrophic events. In the unlikely event an allision or collision involving Phase 1 vessels or components resulted in a large spill, impacts from Phase 1 on water quality would be 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. Overall, the probability of an oil or chemical spill occurring that is large enough to affect water quality is very low, and the degree of impact on water quality would depend on the spill volume. This risk and impact would be similar to that evaluated in BOEM (2021a) and would be localized, short term, and **minor,** with the unlikely event of a large accidental release potentially causing a **moderate** and short-term impact.

All onshore vehicle fueling and major equipment maintenance would be performed off site at commercial service stations or a contractor's yard. A few pieces of large, less mobile equipment (e.g., excavators, paving equipment, and generators) would be refueled, as necessary, on site. Any such field refueling would not be performed within 100 feet of wetlands or waterways (EIS Section G.2.6, Wetlands and Other Waters of the United States), within 100 feet of known private or community potable wells, or within any Town of Barnstable water supply Zone I area. Proper spill containment gear and absorption materials would be maintained for immediate use in the event of any inadvertent spills or leaks. Any proposed Project substation equipment would be equipped with full containment for any components containing dielectric fluid. As a result, Phase 1 would result in **negligible** impacts (including temporary and long-term impacts) on surface and groundwater quality as a result of releases from heavy equipment during construction and other cable installation activities.

Phase 1 could also result in accidental releases of trash and debris; however, these releases would be infrequent and **negligible** because operators would comply with federal and international requirements for management of shipboard trash, and the extent of an accidental release would be limited to the localized area.

**Anchoring and gear utilization:** Under the maximum-case scenario, the applicant would use a nine-point anchoring system for installation of offshore export cables or the inter-link cables within the SWDA. This system would be equipped with spud legs that are deployed to secure the cable laying vessel while its anchors are being repositioned (COP Sections 3.3.1.3.6 and 4.3.1.3.6, Volume I; Epsilon 2022). To install the cable close to shore using tools that are best optimized to achieve sufficient cable burial, the cable laying vessel may temporarily ground nearshore, and a jack-up vessel may be used to facilitate pulling the offshore export cables through HDD conduits installed at the landfall site. Overall, anchoring from Phase 1 construction would affect 177 acres, while offshore wind construction activities within the geographic analysis area for water quality (including Phase 1) would affect 2,267 acres between 2022 and 2030. Although up to seven offshore wind projects (including Phase 1) would be under construction simultaneously in 2025, only a portion of this acreage would be impacted at any single time.

Anchoring can cause resuspension and deposition of sediments in the immediate area of disturbance. Disturbed sediments would be limited to a localized area and would settle shortly (several hours) thereafter (COP Section 5.2.2.1.2, Volume III; Epsilon 2022). Therefore, impacts from Phase 1 on water quality from anchoring and gear utilization would be **negligible**.

**Cable emplacement and maintenance**: Cable emplacement for the proposed Project may disturb up to 52 acres of seabed through dredging in the OECC. The sediment dispersion model for the proposed Project predicted that, with the use of a trailing suction hopper dredge, above-ambient TSS greater than 10 milligrams per liter (mg/L) could persist for 4 to 6 hours throughout the entire water column (COP Section 5.2.2.1.2, Volume III; Epsilon 2022). Phase 1 would disturb up to 200 acres of seabed for offshore cable emplacement, and 242 acres during inter-array and inter-link cable installation. The sediment dispersion model used several simulations for possible cable installation methods and predicted the sediment plume would be located in the bottom, approximately 20 feet of the water column. Above-ambient TSS was predicted to stay within 656 feet of the cable but could possibly extend 1.3 to 1.4 miles; elevated TSS persisted for less than 4 hours. Sediment deposition greater than 1 millimeter is generally confined within 328 to 492 feet of the installation alignment with maximum deposition usually less than 5 millimeters (COP Appendix A, Volume III; Epsilon 2022). Impacts on water quality from construction of Phase 1 due to cable emplacement and resulting suspension of sediment and turbidity would be short term and **minor**.

**Discharges/intakes**: During the proposed 18-month construction stage, approximately 30 to 60 proposed Project vessels would be operating in the geographic analysis area, undertaking an estimated total of 3,000 round trips at an average of 6 round trips per day (COP Section 3.3.1.12.1, Volume I; Epsilon 2022). Vessels are permitted to routinely discharge certain liquid wastes to marine waters, including domestic water, uncontaminated bilge water, treated deck drainage and sumps, uncontaminated ballast water, and uncontaminated fresh or seawater from vessel air conditioning. Other waste such as sewage; solid waste or chemicals; solvents; oils and greases from equipment, vessels, or facilities would be stored and properly disposed of on land or incinerated offshore. The proposed Project would require all vessels to comply with regulatory requirements related to the prevention and control of discharges and the prevention and control of accidental releases. All vessels would need to comply with USCG ballast water management requirements outlined in 33 CFR Part 151 and 46 CFR Part 162, USCG bilge water regulations in 33 CFR Part 151, and the NPDES vessel general permit (as applicable). Allowable vessel discharges such as bilge and ballast water would be restricted to uncontaminated or properly treated liquids.

Based on the BMPs proposed by the proposed Project and compliance with applicable vessel requirements, the impacts on water quality from the Phase 1 discharges would be short term and **minor** during construction.

**Land disturbance**: Onshore components would include construction of a substation, concrete transition vaults, and buried concrete duct banks through which the onshore export or grid interconnection cables would run. The onshore export cable and grid interconnection routes would be primarily located within existing public roadway layouts or utility rights-of-way (ROW), and construction involves standard inert materials such as concrete, polyvinyl chloride conduit, and solid dielectric cable. Proper erosion and sedimentation controls would be maintained to avoid and minimize unstable soils that could potentially be moved by wind and runoff into surface waters and increase turbidity. HDD is expected to be used at the Phase 1 landfall site to minimize land disturbance near the shoreline. It is possible that potential, limited sediment releases could occur during the HDD, but impacts would be localized and short term. As such, impacts from construction of Phase 1 on water quality from land disturbance would be **negligible**.

**Port utilization**: The applicant has identified several port facilities in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey for the proposed Project construction staging activities, although not all ports would be used. No port expansions are included in Alternative B. Each port facility under consideration already has sufficient existing infrastructure or has an area where other entities intend to develop infrastructure with the capacity to support offshore wind activity, including the proposed Project. The increase in vessel activity during construction would be small, and multiple authorities regulate water quality impacts from port activities. Therefore, impacts of Phase 1 construction on water quality from port utilization would be **negligible**.

**Presence of structures**: Phase 1 impacts on water quality due to the presence of structures would be additive with the impacts of structures associated with offshore wind activities and activities other than offshore wind that occur within the water quality geographic analysis area that would remain in place during the life of the proposed Project. Impacts on water quality due to the presence of structures would begin during construction immediately after the structures are installed; however, most impacts under this IPF would occur during Phase 1 operations are discussed in the Operations and Maintenance and Conceptual Decommissioning section.

Phase 1 would add up to 63 stationary structures to the SWDA during construction, involving 74 acres of foundation and scour protection and up to 35 acres of hard protection for offshore, inter-array, and inter-link cables. Results from a recent BOEM (2021b) HDM study found that offshore wind projects have the potential to alter local and regional physical oceanic processes (e.g., currents, temperature stratification) via their influence on currents from WTG foundations and by extracting energy from the wind. These disturbances would be localized but, depending on the hydrologic conditions, have the potential to affect water quality through altering mixing patterns and the formation of sediment plumes. Significant scour is not expected due to anticipated low current speeds and low seabed mobility in the SWDA (COP Section 3.2.2, Volume II, and Section 5.2.2.2.1, Volume III; Epsilon 2022). The addition of scour protection would further minimize impacts on local sediment transport. Furthermore, limited scour is anticipated around each cable due to the target cable burial depths.

In addition, the exposure of offshore wind structures to the marine environment can result in emissions of metals and organic compounds from corrosion protection systems. However, the current understanding of chemical emissions for offshore wind structures is that emissions appear to be small, suggesting a low environmental impact (Kirchgeorg et al. 2018).

The presence of structures during operations could continue to disrupt bottom current patterns, leading to the increased movement, suspension, and deposition of sediments, although significant scour is not expected (COP Volume II, Section 3.2.2 and Volume III Section 5.2.2.2.1; Epsilon 2022). Scour protection for WTGs, ESPs, and cables would limit local sediment transport. The extent of the changes in the currents and mixing would fluctuate seasonally and regionally and affect water quality parameters (e.g., temperature, dissolved oxygen, and salinity). Changes to water quality would be detectable but would not result in degradation of water quality that would exceed water quality standards. Therefore, the impact on water quality from Phase 1 operations would be temporary and **minor**.

Decommissioning of the proposed Project would include removing or retiring onshore and offshore Phase 1 components in place. The impacts of Phase 1 decommissioning would be similar to construction impacts and could include short-term and localized sediment resuspension and deposition. Over the life of the proposed Project, technological advances in methods and equipment may result in increased efficiency and reduction of impacts at the time of decommissioning. As a result, Phase 1 decommissioning impacts on water quality would be **minor**.

***Impacts of Phase 2***

Phase 2 would affect water quality through the following primary IPFs during construction, operations, and decommissioning. If the applicant includes the SCV as part of the final proposed Project design, some or all of the impacts on water quality from the Phase 2 OECC through Muskeget Channel may not occur and would instead occur along the SCV OECC route. BOEM will provide a more detailed analysis of the SCV in a supplemental NEPA analysis. Except where specified, the impacts of SCV construction and operations would be similar to the Phase 2 OECC through Muskeget Channel but would occur in a different location.

The impacts of Phase 2 operations (with or without the SCV) would be the same as Phase 1 operations, and would, thus, be **negligible** to **minor**, with the unlikely event of a large accidental release potentially causing a **moderate** impact.

The SCV would include up to 41 acres of hard protection for offshore export cables. This additional area of hard protection would not change the overall impacts of Phase 2 water quality due to the presence of structures.

The impacts resulting from Phase 2 decommissioning (with or without the SCV) would be similar to, but slightly larger than, those described for Phase 1, due to the increased number of foundations and increased inter-array cable length. The decommissioning impacts from Phase 2 would still, however, be **negligible** to **minor.**

**Accidental releases**: The Phase 2 WTGs and ESPs would store the same volume of coolant, oils, and fuel as the Phase 1 WTGs and ESPs. The potential for collisions/allisions during Phase 2 construction is similar to Phase 1 due to similar vessel traffic volumes. Construction (COP Table 4.3-7, Volume I; Epsilon 2022) of Phase 2 would have similar impacts as Phase 1: infrequent and **negligible.** An allision or collision involving proposed Project vessels or components resulting in a small oil or chemical spill would have **minor** and temporary impacts, while a larger spill would have potentially **moderate** and temporary impacts.

**Anchoring and gear utilization**: Anchoring for Phase 2 construction would affect 245 acres of seafloor and result in the same type and level of anchoring as Phase 1. As a result, Phase 2 anchoring and gear utilization would have **negligible** impacts on water quality.

**Cable emplacement and maintenance**: Phase 2 would affect 67 acres of seabed due to dredging in the OECC, 352 acres of seabed for offshore cable emplacement, and 380 acres of seabed for inter-array and inter-link cable installation. The same sediment dispersion model discussed in Phase 1 can be applied to Phase 2. Impacts on water quality would decrease as the sediment settles in the high turbidity areas. Impacts on water quality from Phase 2 cable emplacement and maintenance due to increased suspension of sediment and turbidity would be short term and **minor**.

The SCV would affect up to 379 acres of seafloor. A dispersion model for the SCV found that TSS concentrations greater than 10 mg/L could extend up to 0.6 mile but would typically extend less than 500 feet from the cable centerline with most of the sediment settling out within 2 to 3 hours and all within 6 hours. A deposition of 1 millimeter remained within 656 feet of the cable centerline, and no deposition would reach 5 millimeters thickness (Epsilon 2022). As a result, the impacts on water quality from the SCV would be short term and **minor.**

**Discharges/intakes**: Phase 2 would have the same level of vessel traffic (approximately 30 to a maximum of 60 vessels) during the 18-month construction stage as Phase 1 (COP Section 4.3.1.12, Volume I; Epsilon 2022). Therefore, the impacts of discharges on water quality during construction of Phase 2 would be similar to those for Phase 1: short term and **minor**.

**Land disturbance**: Phase 2 onshore components would largely be separate from the Phase 1 onshore components, although the Phase 1 and Phase 2 OECR could be collocated near the West Barnstable Substation and along the grid interconnection route. The applicant may identify one or more separate Phase 2 substation sites within the Town of Barnstable. The Phase 2 OECR could also be longer than the Phase 1 OECR (up to 10.6 miles for Phase 2, compared to up to 6.5 miles for Phase 1); however, the Phase 2 construction impacts on water quality from land disturbance would be similar in type and extent to those for Phase 1: localized, short term, and **negligible**.

The SCV would include a cable landing site, OECR, substation, and grid interconnection point in Bristol County, Massachusetts. The land disturbance impacts of the SCV will be evaluated in a supplemental NEPA analysis if the applicant determines that the SCV will be used.

**Presence of structures**: As with Phase 1, the impacts on water quality due to the presence of structures would begin during construction, but most impacts under this IPF would occur during operations. The impacts of Phase 2 construction on water quality due to the presence of structures would be similar to Phase 1: short term and **minor**.

**Port utilization**: Phase 2 (with or without the SCV) would utilize the same ports and involve the same level of vessel traffic as Phase 1. Therefore, the impacts of port utilization on water quality during construction of Phase 2 would be the same as Phase 1: **negligible**.

***Cumulative Impacts***

The cumulative impacts of Alternative B considered the impacts of Alternative B in combination with other ongoing and planned wind activities. Ongoing and planned non-offshore wind activities described in Table G.1-15 would contribute to impact on water quality through the primary IPFs of accidental releases, cable emplacement and maintenance, discharges and intakes, and presence of structures. These impacts would primarily occur through release of materials and sedimentation. Cumulative impacts on water quality would range from **negligible** to **minor**.

***Conclusions***

**Impacts of Alternative B.** Construction, operations, and decommissioning of Alternative B would result in sediment resuspension and deposition, an increased potential for accidental releases, and changes to water mixing patterns that could affect water quality. Operational impacts would be smaller than construction and decommissioning impacts. The impacts resulting from Phase 1 and Phase 2 would be **negligible** to **minor**, although the impact of the unlikely event of a large accidental release could be **moderate**. Therefore, the overall impact on water quality from Alternative B would be **minor** because the impact would be small, and the resource would recover completely without remedial or mitigating action after decommissioning.

**Cumulative Impacts of Alternative B.** In the context of ongoing and planned activities, the incremental impacts of Alternative B resulting from individual IPFs would range from **negligible** to **moderate**. Considering all the IPFs, the overall impacts associated with Alternative B when combined with past, present, and future actions would be localized and **negligible** to **moderate** and would not alter the overall character of water quality in the geographic analysis area. The main drivers for this impact rating are the short-term, localized impacts from increased turbidity and sedimentation due to anchoring and gear utilization and cable emplacement and maintenance during construction and alteration of water currents and increased sedimentation during operations due to the presence of structures. A **moderate** impact resulting from accidental releases could occur; however, this level of impact would be unlikely and occur only in the event of a large-volume, catastrophic release.

As a result, the likely overall impacts of Alternative B on water quality would qualify as **minor** because measurable impacts are anticipated, but the impacts would be small, and the resource would recover completely after decommissioning without remedial or mitigating action.

**Impacts of Alternative C – Habitat Impact Minimization Alternative on Water Quality**

Alternatives C-1 and C-2 would not affect the number or placement of WTGs or ESPs for the proposed Project compared to Alternative B. Alternatives C-1 and C-2 would alter the exact routes of inter-array, inter-link, and export cables installed for the proposed Project, and could, thus, affect the exact length of cable installed and area of ocean floor disturbed or the exact location of construction or maintenance vessel activity. These differences would not result in meaningfully different impacts compared to Alternative B. Therefore, the impacts of Alternatives C-1 and C-2 on water quality would be the same as those for Alternative B.

### G.2.3 Bats

#### G.2.3.1 Description of the Affected Environment

This section discusses existing bat resources in the bat geographic analysis area, as described in Table D-1 in EIS Appendix D, Geographical Analysis Areas, and shown on Figure G.2.3-1. Specifically, the geographic analysis area for bats includes the U.S. East Coast, from Maine to Florida, and extends 100 miles offshore and 5 miles inland to capture the movement range for species in this group. Table G.2.3-1 describes existing conditions and impacts, based on IPFs assessed, of ongoing and planned activities other than offshore wind, which is discussed below.

**Table G.2.3-1: Bat Species Potentially Present in Massachusetts**

| Common Name | Scientific Name | State Status | Federal Status |
|---|---|---|---|
| **Cave Bats** | | | |
| Big brown bat | *Eptesicus fuscus* | Not listed | Not listed |
| Eastern small-footed bat | *Myotis leibii* | Endangered | Not listed |
| Little brown bat | *Myotis lucifugus* | Endangered | Not listed |
| Northern long-eared bat | *Myotis septentrionalis* | Endangered | Threatened[a] |
| Indiana bat[b] | *Myotis sodalis* | Endangered | Endangered |
| Tri-colored bat | *Perimyotis subflavus* | Endangered | Not listed[c] |
| **Tree Bats** | | | |
| Silver-haired bat | *Lasionycteris noctivagans* | Not listed | Not listed |
| Eastern red bat | *Lasiurus borealis* | Not listed | Not listed |
| Hoary bat | *Lasiurus cinereus* | Not listed | Not listed |

Source: BOEM 2012; USFWS 2022

USFWS = U.S. Fish and Wildlife Service
a The USFWS has proposed to list the northern long-eared bat as Endangered.
b This species does not occur in eastern Massachusetts.
c The USFWS has proposed to list the tri-colored bat as Endangered.

Nine species of bats occur within Massachusetts, eight of which may be present in the onshore portions of the proposed Project area (Table G.2.3-1). Bat species consist of two distinct groups based on their overwintering strategy: cave-hibernating bats (cave bats) and migratory tree bats (tree bats). Bats are terrestrial species that spend their lives on or over land. On occasion, tree bats may potentially occur offshore during spring and fall migration and under specific conditions like low wind and high temperatures. Recent studies, combined with historical anecdotal accounts, indicate migratory tree bats sporadically travel offshore during spring and fall migration, with 80 percent of acoustic detections occurring in August and September (Dowling et al. 2017; Hatch et al. 2013; Pelletier et al. 2013; Stantec 2016). However, unlike tree bats, the likelihood of detecting a cave bat is substantially less in offshore areas (Pelletier et al. 2013). Regionally, both resident and migrant tree and cave bat species occur on islands within Nantucket Sound, indicating that over-water crossings occur (MMS 2008). Dowling et al. (2017) documented little brown bats (*Myotis lucifugus*) and eastern red bats (*Lasiurus borealis*) leaving Nantucket Island and crossing open water in August and September, which is consistent with the migratory chronology of these species. In all cases, these movements were toward shore and away from the SWDA. Pre-construction studies at the Block Island Wind Farm indicate that bat use off Block Island is largely limited to the island and nearshore waters, with limited acoustic detections in offshore habitats (TetraTech 2012). Similarly, no identifiable bat echolocation calls were detected at the Cape Wind Energy Project area or adjacent open water in Nantucket Sound during monthly surveys in 2013 conducted by Cape Wind Associates from April to October (ESS Group, Inc. 2014).

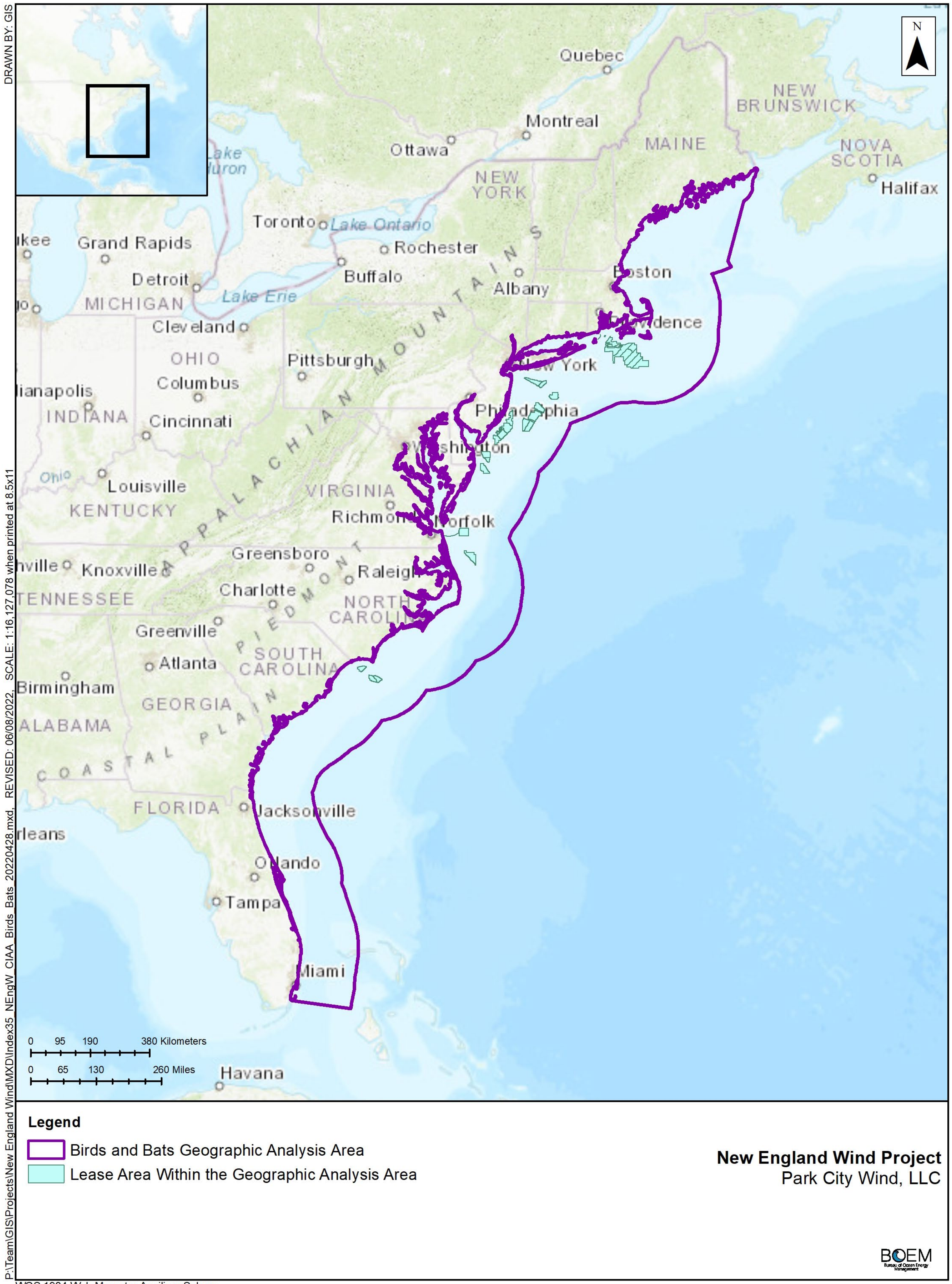


**Figure G.2.3-1: Geographic Analysis Area for Bats**

Existing data from meteorological buoys provide the best opportunity to further define bat use of open-water habitat far from shore where the applicant would site the proposed Project WTGs. Despite significant distance from any suitable terrestrial habitat, five meteorological buoys in the Gulf of Maine detected bats; however, detection rates were the lowest at these sites and use was sporadic when compared to sites located on offshore islands (Stantec 2016). Of the relatively few (372) bat passes recorded at offshore buoys, only 14 (4 percent) were attributed to cave bats (Stantec 2016), confirming the limited use of open water habitats by cave bats. Acoustic detectors in the Gulf of Maine and Great Lakes documented higher than expected proportions of Myotis calls, suggesting that individuals of this genus are capable of, and may frequently make, long-distance, offshore flights (Stantec 2016). The same study reported very little offshore activity of Myotis species in the mid-Atlantic. In a separate mid-Atlantic study, the maximum distance Myotis bats were detected offshore was 7.2 miles (Sjollema et al. 2014). Results from a recent publication show a negative relationship between bat activity and distance from the coast. Specifically, at the nearshore survey location, the number of detections was up to 24 times higher compared to the offshore locations (Brabant et al. 2021). Data from New York State Energy Research and Development Authority metocean buoys deployed within the New York Bight indicate that only ten calls were recorded (nine identified silver-haired bats [*Lasionycteris noctivagans*] and one unknown low-frequency [i.e., non-*mytois*] species) from August 2019 to June 2022, all of which occurred in August, September, and October (Normandeau 2022). Given these data, the potential exists for some migratory tree bats to encounter offshore facilities during spring and fall migration. This exposure risk would be limited to very few individual tree bats and would occur, if at all, during migration. Given the distance of the SWDA from shore, BOEM does not expect foraging bats to encounter operating WTGs outside spring and fall migration.

The onshore areas in the region of Alternative B include forested habitats that provide features suitable for use by roosting and/or foraging bats (COP Section 6.3.1, Volume III; Epsilon 2021), as well as dense residential, industrial, and commercial development. All eight species of bats with the potential to occur in eastern Massachusetts may be present near the onshore facilities. The federally threatened northern long-eared bat (*Myotis septentrionalis*) occurs throughout Massachusetts, including on Cape Cod, Martha’s Vineyard, and Nantucket. See the Biological Assessment (BA) for further details on this species (BOEM 2022b). The federally endangered Indiana bat (*Myotis sodalis*) is not known to occur in the greater Cape Cod region and is not discussed further. Several state endangered species—the eastern small-footed bat (*Myotis leibii*), the little brown bat, and the tri-colored bat (*Perimyotis subflavus*)—may occur within the onshore portions of the proposed Project area and may have been heavily impacted by white nose syndrome (WNS), a fungal disease in the United States resulting in mortality as high as 90 percent at some hibernation sites (Blehart et al. 2009; Gargas et al. 2009; Turner et al. 2011). The terrestrial ecology of northern long-eared bats is well understood; these bats forage under closed canopy ridges and hillsides, typically relatively close to occupied roost trees (Brack and Whitaker 2001; Broders et al. 2006; Henderson and Broders 2008; Lacki et al. 2009; Owen et al. 2002). Although the presence of northern long-eared bats on Martha’s Vineyard and Nantucket illustrates that the species can cross open water habitats, there are no records of northern long-eared bats migrating to and from islands (BOEM 2015; Dowling et al. 2017; Pelletier et al. 2013). Therefore, it is unlikely that northern long-eared bats would fly over the open ocean near the SWDA. For the same reason, it is unlikely that state-endangered eastern small-footed, little brown, or tri-colored bats would encounter offshore facilities during migration (BOEM 2015; Pelletier et al. 2013).

On March 22, 2022, the U.S. Fish and Wildlife Service (USFWS) published a proposed rule to reclassify the northern long-eared bat as endangered. A final decision on the proposed rule is expected in November 2022. If reclassified, the full suite of prohibitions and exceptions to take of endangered species would be applied to the northern long-eared bat, and exemptions for incidental take of the species, as described under the current 4(d) Rule, would no longer apply (87 Fed. Reg. 56 [March 23,2022]). BOEM assumes the applicant would conduct tree-clearing activities during the seasonal clearing window of

November 1 through March 31, and impacts, if any, would not rise to the level of take. Should tree-clearing activities occur outside of this timeframe, species-specific presence/probable absence surveys would be required for Endangered Species Act (ESA) compliance. Further details regarding potential impacts on northern long-eared bats is provided in the proposed Project-specific BA (BOEM 2022b).

Bats within the geographic analysis area are subject to pressure from ongoing activities, generally associated with onshore impacts, including onshore construction and climate change. Onshore construction activities, and associated impacts, would continue at current trends and have the potential to result in impacts on bat species. Impacts associated with climate change have the potential to reduce reproductive output and increase individual mortality and disease occurrence. Additionally, cave bat species, including the northern long-eared bat, are experiencing drastic declines due to WNS. In Massachusetts, the eastern small-footed bat's population status is unknown, but WNS and human disturbances during hibernation threaten it (Mass Wildlife 2015a). The little brown bat was once the most abundant bat species in this region but has suffered from WNS (Mass Wildlife 2015b). Likewise, WNS has devastated the tri-colored bat in the last 10 years (Mass Wildlife 2015c). Proposed Project-related activities have the potential to result in impacts on cave bat populations already affected by WNS. The unprecedented mortality of millions of bats in North America as of 2015 reduces the likelihood of many individuals being present within the onshore portions of the proposed Project area (USFWS 2022).

### G.2.3.2 Environmental Consequences

Definitions of impact levels for bats are described in Table G.2.3-2. There are no beneficial impacts on bats.

**Table G.2.3-2: Impact Level Definitions for Bats**

| Impact Level | Impact Type | Definition |
|---|---|---|
| Negligible | Adverse | Impacts would be so small as to be unmeasurable. |
| Minor | Adverse | Most impacts would be avoided; if impacts occur, the loss of one or few individuals or temporary alteration of habitat could represent a minor impact, depending on the time of year and number of individuals involved. |
| Moderate | Adverse | Impacts are unavoidable but would not result in population-level impacts or threaten overall habitat function. |
| Major | Adverse | Impacts would result in severe, long-term habitat or population-level impacts on species. |

#### Impacts of Alternative A – No Action Alternative on Bats

When analyzing the impacts of Alternative A on bats, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the existing conditions for bats (Table G.1-16). The cumulative impacts of Alternative A considered the impacts of Alternative A in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix E, Planned Activities Scenario.

Under Alternative A, existing conditions for bats described in Section G.2.3.1 would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore wind activities (generally onshore activities) within the geographic analysis area that contribute to impacts on bats would include onshore construction and climate change. Impacts associated with climate change have the potential to reduce reproductive output, increase individual mortality, and increase disease occurrence (Table G.1-16). In the case of most cave bat species, WNS would continue to strain populations. Ongoing impacts from onshore construction activities have the potential to result in impacts on bats and would continue regardless of the offshore wind industry. For several tree bat species, expansion of terrestrial wind energy development in the geographic analysis area to meet current demand would continue to result in some incidental take each year during migration and would also result in a slight increase in forest fragmentation and habitat loss.

Ongoing offshore wind activities within the geographic analysis area that contribute to impacts on bats include continued operation of the Block Island Wind Farm, as well as ongoing construction of Vineyard Wind 1 in OCS-A 0501 and the South Fork Wind Project in OCS-A 0517. Ongoing operation of the Block Island Wind Farm and ongoing construction of Vineyard Wind 1 and South Fork Wind Project, along with planned offshore wind activities, would affect bats through the primary IPFs described below.

**Cumulative Impacts**

The cumulative impact analysis for Alternative A considers the impacts of Alternative A in combination with other planned non-offshore wind activities and planned offshore wind activities (other than Alternative B). Future offshore wind development activities would affect bats through the following primary IPFs.

**Climate change:** In addition to increasing storm severity and frequency, climate change can increase disease frequency. Storms during breeding and roosting season can reduce productivity and increase mortality. Intensity of this impact is speculative. Disease can weaken individuals, lower reproductive output, and/or kill individuals, and some tropical diseases could move northward. The extent and intensity of this impact is highly speculative.

**Land disturbance:** A small amount of infrequent construction impacts associated with onshore power infrastructure would be required between 2022 and 2030 and beyond to tie future offshore wind energy projects to the electric grid. Typically, this would require only insignificant amounts of habitat removal, if any, and would occur in previously disturbed areas. Short-term, temporary impacts associated with habitat loss or avoidance during construction may occur, but no injury or mortality of individuals would be expected. As such, onshore construction activities associated with future offshore wind development would not appreciably contribute to overall impacts on bats.

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 would increase modestly and require some conversion of undeveloped land to meet port demand. This conversion could result in permanent habitat loss for local bat populations. However, the incremental increase from future offshore wind development would be a minimal contribution in the port expansion required to meet all increased commercial, industrial, and recreational demand (BOEM 2019a).

**Noise:** Anthropogenic noise on the OCS associated with future offshore wind development, including noise from pile-driving and construction activities, has the potential to affect bats on the OCS. Additionally, onshore construction noise has the potential to affect bats. These impacts would be temporary and highly localized.

Construction of up to 2,955 offshore structures within the geographic analysis area (EIS Appendix E) would create noise and may temporarily affect some migrating tree bats, if conducted at night during spring or fall migration. The greatest noise impact is likely to be caused by pile-driving activities during construction. Noise from pile driving would occur during installation of foundations for offshore structures at a frequency of 4 to 6 hours at a time from 2022 through 2030 and beyond. Construction activity would be short term, temporary, and highly localized. Auditory impacts are not expected, as recent research has shown that bats may be less sensitive to temporary threshold shifts than other terrestrial mammals (Simmons et al. 2016). Habitat-related 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 by individual migrating tree bats (Schaub et al. 2008). These impacts would be limited to behavioral avoidance of pile-driving and/or construction activity, and no temporary or permanent hearing loss would be expected (Simmons et al. 2016). However, these impacts are highly unlikely because bats are expected to make little use of the OCS and would only use the OCS during spring and fall migration.

Some potential for short-term, temporary, localized habitat impacts arising from onshore construction noise exists; however, no auditory impacts on bats would be expected. Recent literature suggests that bats are less susceptible to temporary or permanent hearing loss due to 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. Some temporary displacement and/or avoidance of potentially suitable foraging habitat could occur, but these impacts would not be biologically significant. Some bats roosting in the vicinity of construction activities may be disturbed during construction but would move to a different roost farther from construction noise. This would not result in any impacts, as frequent roost switching is common among bats (Hann et al. 2017; Whitaker 1998). Non-routine activities associated with the 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 non-routine event. Impacts on bats, if any, would be temporary and last only during these non-routine events.

Given the temporary and localized nature of potential impacts and the expected biologically insignificant response to those impacts, no individual fitness or population-level impacts would be expected as a result of onshore or offshore noise associated with future offshore wind development.

**Presence of structures:** The presence of up to 2,955 WTGs and ESPs on the OCS could affect bats. Cave bats (including the federally threatened northern long-eared bat and the state-endangered small-footed bat, little brown bat, and tri-colored bat) do not tend to fly offshore (even during fall migration) and, therefore, exposure to construction vessels during construction or maintenance activities, or the rotor-swept area of operating WTGs in the lease areas would be limited (BOEM 2015; Pelletier et al. 2013). Tree bats, however, may pass through the offshore wind development areas during the fall migration. There is limited potential for migrating bats to encounter vessels during construction and decommissioning of WTGs, ESPs, and OECCs, although structure and vessel lights may attract bats due to increased prey abundance. As discussed above, while bats have been documented at offshore islands, relatively little bat activity has been documented in open water habitat similar to the conditions in the SWDA. Several authors 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 bat attraction to WTGs in the Atlantic OCS 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 2008; Kunz et al. 2007). However, there is no definitive answer as to why, if at all, bats are attracted to WTGs has been postulated, despite intensive studies at onshore wind facilities. As such, it is possible that some bats may encounter, or perhaps be attracted to, the potential 2,955 structures to opportunistically roost or forage. However, bats' echolocation abilities and agility make it unlikely that these stationary objects 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 the operating WTGs in the offshore lease areas include the eastern red bat, the hoary bat (*Lasiurus cinereus*), and the silver-haired bat. Offshore operations would present a seasonal risk factor to migratory tree bats that may use the offshore habitats during fall migration. While some potential exists for migrating tree bats to encounter operating WTGs during fall migration, the overall occurrence of bats on the OCS is low (Stantec 2016). Given the expected infrequent and limited use of the OCS by migrating tree bats, very few individuals would encounter operating WTGs or other structures associated with future offshore wind development. With the proposed 1 nautical mile (1.9 kilometers, 1.15 miles) spacing between structures associated with future offshore wind development and the distribution of anticipated projects, individual bats migrating over the OCS within the rotor-swept area of proposed Project WTGs would likely pass through projects with only slight course corrections, if any, to avoid operating WTGs, due to the fact that unlike terrestrial migration routes, there are no landscape features that would concentrate migrating tree bats and increase exposure to WTG on the OCS (Baerwald and Barclay 2009; Cryan and Barclay 2009; Fiedler 2004; Hamilton 2012; Smith and McWilliams 2016). Additionally, the potential collision risk to migrating tree bats varies with climatic conditions (e.g., 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, and the patchiness of projects, 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, as bats have been shown to suppress activity during periods of strong winds, low temperatures, and rain (Arnett et al. 2008; Erickson et al. 2002).

**Other considerations:** Ongoing activities, future non-offshore wind activities, and future offshore wind activities other than the proposed Project may affect the currently federally threatened northern long-eared bat and the proposed federally endangered tri-colored bat. As described above and discussed further in the BA (BOEM 2022b), the possibility of impacts on these species would be limited to onshore impacts, generally during onshore facilities construction.

***Conclusions***

**Impacts of Alternative A.** Under Alternative A, bats would continue to follow current regional trends and respond to current and future environmental and societal activities. While the proposed Project would not be built as proposed under Alternative A, ongoing activities would have continuing temporary to permanent impacts (disturbance, displacement, injury, mortality, and habitat conversion) on bats primarily through the onshore construction impacts, the presence of structures, and climate change. The potential impacts of ongoing activities would be **negligible.**

**Cumulative Impacts of Alternative A.** In addition to ongoing activities, the impacts of planned activities other than offshore wind development may also contribute to impacts on bats, including increasing onshore construction (Table G.1-16), but these impacts would be **negligible**. The combination of ongoing and planned activities other than offshore wind development would result in **negligible** impacts on bats.

Considering all the IPFs together, the overall impacts associated with future offshore wind activities in the geographic analysis area, not including the proposed Project, would result in **negligible** impacts, notwithstanding 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 since cave bats do not typically occur on the OCS, none of the IPFs associated with future offshore wind activities that occur offshore would 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, onshore habitat removal is anticipated to be minimal when compared to other ongoing and planned activities, and any impacts resulting from habitat loss or disturbance would not result in individual fitness or population-level impacts within the bat geographic analysis area.

**Relevant Design Parameters and Potential Variances in Impacts**

The bat geographic analysis area was established to capture most of the movement range for migratory species. Northern long-eared bats and other cave bats do not typically occur on the OCS. Tree bats are long-distance migrants; their range includes most of the East Coast from Florida to Maine. Although these species have been documented traversing the open ocean and have the potential to encounter WTGs, use of offshore habitat is thought to be limited and generally restricted to spring and fall migration. The onshore limit of the geographic scope is intended to cover most of the onshore habitat used by those species that may encounter the proposed Project during most of their life cycles.

The following proposed Project design parameters (EIS Appendix C, Project Design Envelope and Maximum-Case Scenario) would influence the magnitude of the impacts on bats:

- One or two new onshore substations, which could require the removal of forested habitat that is potentially suitable for roosting and foraging;
- The number, size, and location of WTGs; and
- The time of year during which construction occurs.

This assessment analyzes the maximum-case scenario. Any potential variances in the proposed Project build-out as defined in the PDE (i.e., number and size of WTGs and construction timing) would result in similar or lesser impacts than described below.

**Impacts of Alternative B – Proposed Action on Bats**

This section identifies potential impacts of Alternative B on bats. BOEM prepared a BA for the potential impacts on USFWS federally listed species, which found that Alternative B was not likely to affect, or had no effect, on listed species and/or designated critical habitat (BOEM 2022b).

***Impacts of Phase 1***

Phase 1 would affect bats through the following primary IPFs during construction, operations, and decommissioning. Except where otherwise stated, the impacts of Phase 1 decommissioning would be similar to those for Phase 1 construction for all of the IPFs described below.

**Land disturbance:** Impacts associated with construction of Phase 1 onshore elements could occur if construction activities occur during the active season (generally April through October) and may result in injury or mortality of individuals, particularly juveniles who are unable to flush from a roost if occupied by bats at the time of removal. BOEM assumes that tree-clearing activities would occur during the hibernation period (November 1 through March 31), thus limiting the potential for direct injury or mortality from the removal of occupied roost trees). Should tree clearing be required during the period when bats may be using trees within the geographic analysis area for bats, species-specific presence/probable absence surveys would be conducted to determine if the species is present, and additional consultation with USFWS would occur. There would be some potential for habitat impacts on bats as a result of the loss of potentially suitable roosting and/or foraging habitat. However, the proposed Project would only remove 6.7 acres of marginal quality habitat that is characterized by a cluttered understory, which limits its suitability. Further, contiguous blocks of potentially suitable habitat are located near the site where forested habitat would be removed. **Negligible** impacts, if any, would occur with adherence to USFWS northern long-eared bat conservation measures and, these impacts would not result in individual fitness or population-level impacts given the limited amount of habitat removal and the presence of contiguous blocks of potentially suitable habitat in the vicinity. These impacts can also result in long-term to permanent impacts that would be **negligible**. The applicant would likely leave onshore facilities in place for future use (EIS Chapter 2, Alternatives). There are no plans to disturb the land surface or terrestrial habitat during decommissioning. Therefore, onshore temporary impacts of decommissioning would be **negligible**.

While the significance level of impacts would remain the same, BOEM is evaluating the following mitigation and monitoring measure to address impacts on bats, as described in detail in Table H-2 of EIS Appendix H, Mitigation and Monitoring. The Final EIS will list the mitigation and monitoring measures that BOEM would require as a condition of COP approval:

- Require that trees (greater than 3-inch-diameter at breast height) not be cleared from April 1 to October 31. Should presence/probable absence surveys be conducted pursuant to current USFWS protocols and no northern long-eared bats be documented, this measure may not be necessary for ESA compliance relative to this species.

**Noise:** Pile-driving noise and onshore and offshore construction noise associated with Phase 1 would result in **negligible** impacts. Construction activity would be short term, temporary, and highly localized. Auditory impacts are not expected, as recent research has shown 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 activity, and no temporary or permanent hearing loss would be expected (Simmons et al. 2016).

**Presence of structures:** The various types of impacts on bats that could result from the presence of structures, such as migration disturbance and turbine strikes, are described in detail under Alternative A. Using the assumptions in Table E-1, there could be up to 3,031 new WTGs in the geographic analysis area for bats where few currently exist, of which up to 62 (2.0 percent of the total) would be for Phase 1. The structures associated with Phase 1, and the consequential **negligible** impacts, would remain at least until decommissioning of the proposed Project is complete. At this time, there is some uncertainty regarding the level of bat use of the OCS, and the ultimate population-level consequences of individual mortality, if any, associated with operating WTGs. Given the drastic reduction in cave bat populations in the region, the biological significance of mortality resulting from Alternative B, if any, may be increased. However, as described in Section G.2.3.1, existing data from meteorological buoys provide the best opportunity to further define bat use of open-water habitat far from shore where the applicant would site the proposed Project WTGs. Relatively few (372) bat passes were detected at meteorological buoy sites in the Gulf of Maine and in the Mid-Atlantic and use was sporadic when compared to sites on offshore islands (Stantec 2016). While the significance level of impacts would remain the same, BOEM is evaluating the following mitigation and monitoring measure to address impacts on bats, as described in detail in Table H-2 of EIS Appendix H. The Final EIS will list the mitigation and monitoring measures that BOEM would require as a condition of COP approval:

- Deploy acoustic bat detectors on a subset of WTGs and/or ESPs to refine the understanding of bat use of the OCS and SWDA. Deployment configuration and number of detectors would be determined in consultation with applicable stakeholders.

***Impacts of Phase 2***

Phase 2 would affect bats through the following primary IPFs during construction, operations, and decommissioning. If the SCV is chosen, Phase 2 impacts would be the same as those described under Phase 1.

**Land disturbance:** Impacts resulting from onshore land disturbance associated with construction of Phase 2 onshore elements would be similar to those described under Phase 1: **negligible** impacts, if any, with adherence to USFWS northern long-eared bat conservation measures. These impacts would not result in individual fitness or population-level impacts. While the site(s) for up to two onshore substations for Phase 2 have not been selected, the largest parcel, or combination of parcels currently under consideration, totals 38 acres in size. While the total acreage of forested habitat to be removed is greater than described under Phase 1 and could result in habitat loss and increased forest fragmentation, population or individual impacts would not be expected. While the significance level of impacts would remain the same, BOEM is evaluating the following mitigation and monitoring measure to address impacts on bats, as described in detail in Table H-2 of EIS Appendix H. The Final EIS will list the mitigation and monitoring measures that BOEM would require as a condition of COP approval:

- Require that trees (greater than 3-inch-diameter at breast height) not be cleared from April 1 to October 31. Should presence/probable absence surveys be conducted pursuant to current USFWS protocols and no northern long-eared bats be documented, this measure may not be necessary for ESA compliance relative to this species.

**Noise:** Impacts of pile-driving noise and onshore and offshore construction noise associated with Phase 2 would be similar to those described under Phase 1: **negligible**. While pile-driving noise associated with the installation of Phase 2 WTGs would occur over a longer period due to the larger number of turbines to be installed, construction activity would be short term, temporary, and highly localized. Impacts, if any, would be limited to behavioral avoidance of pile driving and/or construction activity, and no temporary or permanent hearing loss would be expected (Simmons et al. 2016).

**Presence of structures:** The various types of impacts on bats that could result from the presence of structures, such as migration disturbance and turbine strikes, are described in detail under Alternative A. Using the assumptions in Table E-1, there could be up to 3,031 new WTGs and ESPs in the geographic analysis area where few currently exist, of which up to 88 (2.9 percent of the total) would be for Phase 2. The structures associated with Phase 2, and the consequential **negligible** impacts, would remain at least until decommissioning of the proposed Project is complete. While the significance level of impacts would remain the same, BOEM is evaluating the following mitigation and monitoring measure to address impacts on bats, as described in detail in Table H-2 of EIS Appendix H. The Final EIS will list the mitigation and monitoring measures that BOEM would require as a condition of COP approval:

- Deploy acoustic bat detectors on a subset of WTGs and/or ESPs to refine the understanding of bat use of the OCS and SWDA. Deployment configuration and number of detectors would be determined in consultation with applicable stakeholders.

***Cumulative Impacts***

The cumulative impacts of Alternative B considered the impacts of Alternative B in combination with other ongoing and planned wind activities. Ongoing and planned non-offshore wind activities described in Table G.1-16 would contribute to impacts on bats through the primary IPFs of land disturbance and the presence of structures. These impacts would primarily occur through habitat loss and potential interactions with operating WTGs. The cumulative impacts of all IPFs from ongoing and planned activities, including Alternative B, would be **negligible**.

***Conclusions***

**Impacts of Alternative B.** In summary, construction and decommissioning of Alternative B would have **negligible** 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 **negligible** long-term impacts in the form of mortality, although this would be rare. The impact conclusions for ongoing and future non-offshore wind activities are presented under Alternative A.

**Cumulative Impacts of Alternative B.** The cumulative impacts on bats within the geographic analysis area would be **negligible**. Considering all the IPFs together, the impacts from ongoing and planned activities, including Alternative B, would result in **negligible** impacts on bats in the geographic analysis area, primarily due to ongoing climate change and onshore habitat loss. Alternative B 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 **negligible** because no measurable impacts are expected due to the expected absence of bats within the SWDA.

While the significance level of impacts would remain the same, BOEM is evaluating the following mitigation and monitoring measures to address impacts on bats, as described in detail in Table H-2 of Appendix H. The Final EIS will list the mitigation and monitoring measures that BOEM would require as a condition of COP approval:

- Require that trees (greater than 3-inch-diameter at breast height) not be cleared from April 1 to October 31. Should presence/probable absence surveys be conducted pursuant to current USFWS protocols and no northern long-eared bats be documented, this measure may not be necessary for ESA compliance relative to this species.
- Deploy acoustic bat detectors on a subset of WTGs and/or ESPs to refine the understanding of bat use of the OCS and SWDA. Deployment configuration and number of detectors would be determined in consultation with applicable stakeholders.

**Impacts of Alternative C – Habitat Impact Minimization Alternative on Bats**

Alternatives C-1 and C-2 would not affect the number or placement of WTGs or ESPs for the proposed Project compared to Alternative B. While Alternatives C-1 and C-2 would alter the exact routes of inter-array, inter-link, and export cables installed for the proposed Project—and could, thus, affect the exact length of cable installed and area of seafloor disturbed—these changes would not result in meaningfully different impacts on bats compared to Alternative B. Therefore, the impacts of Alternatives C-1 and C-2 on bats would the same as those for Alternative B.

## G.2.4 Birds

### G.2.4.1 Description of the Affected Environment

#### Geographic Analysis Area

This section addresses potential impacts on bird species that use marine, coastal, and/or offshore habitats, including both resident individuals that use the proposed Project area during all (or portions of) the year and migrating individuals with the potential to pass through the proposed Project area during fall and/or spring migration. The geographic analysis area for birds includes the East Coast from Maine to Florida in order to cover migratory species that may encounter the proposed Project and that use habitats along these states, as described in Table D-1 in EIS Appendix D, Geographic Analysis Areas, and shown on Figure G.2.4-1. The geographic analysis area extends 100 miles offshore from the Atlantic Ocean shore to capture the migratory movements of most species and 0.5 mile inland to cover onshore habitats used by birds that could be affected by proposed onshore Project components.

Detailed information regarding species potentially present can be found in the COP and is incorporated by reference (Volume III, Sections 6.1, 6.2, Appendix III-C, and Appendix III-D; Epsilon 2022). A general overview of that information is included below, as well as federally listed threatened and endangered species. Further information on threatened and endangered bird species is provided in the BA for the proposed Project (BOEM 2022b).

#### Overview of Birds

The SWDA is located between two Large Marine Ecosystems (LME[2]): the Scotian Shelf to the north (the Gulf of Maine) and the Northeast United States Continental Shelf to the south (the Mid-Atlantic Bight) (LMEHub 2022). This region is important to birds because it is used by a suite of breeding birds from both oceanographic regions. In addition, non-breeding summer migrants (e.g., shearwaters and storm-petrels) constitute a significant portion of the marine birds present (Nisbet et al. 2013). The SWDA is no exception, with an influx of southern hemisphere breeding species present during the boreal summer/austral winter (Veit et al. 2016).

While the terrestrial and coastal avifauna of the geographic analysis area is rich and diverse with, for example, around 450 species recorded in Massachusetts alone (Blodget 2002). Many of these species are rarities or unlikely to occur in the offshore portion of the proposed Project area. Breeding and wintering birds that are likely to use or pass through the offshore proposed Project area include primarily marine birds such as seabirds and sea ducks. Numerous shorebirds, waterfowl, wading birds, raptors, and songbirds are also expected to occur, although more typically in the coastal and onshore portions of the proposed Project area. The most likely of these to occur in the SWDA are waterfowl, loons and grebes, shearwaters and petrels, gannet and cormorants, shorebirds, gulls, terns, jaegers, and auks (BOEM 2014). Bird use of the SWDA and surrounding area is well-documented with multiple studies providing important information on avian presence and abundances at a series of useful scales (Veit et al. 2016; Curtice et al. 2019; COP Appendix III-C; Epsilon 2022).

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[2] LMEs are delineated based on ecological criteria including bathymetry, hydrography, productivity, and trophic relationships among populations of marine species, and NOAA uses them as the basis for ecosystem-based management.

***Threatened and Endangered Species***

At least three federally listed birds have the potential to occur within the proposed Project area: Roseate Tern (*Sterna dougallii*), Piping Plover (*Charadrius melodus*), and Red Knot (*Calidris canutus rufa*). The BA provides a detailed description and analysis of potential impacts on ESA-listed species and potential impacts on these species as a result of the proposed Project (BOEM 2022b).

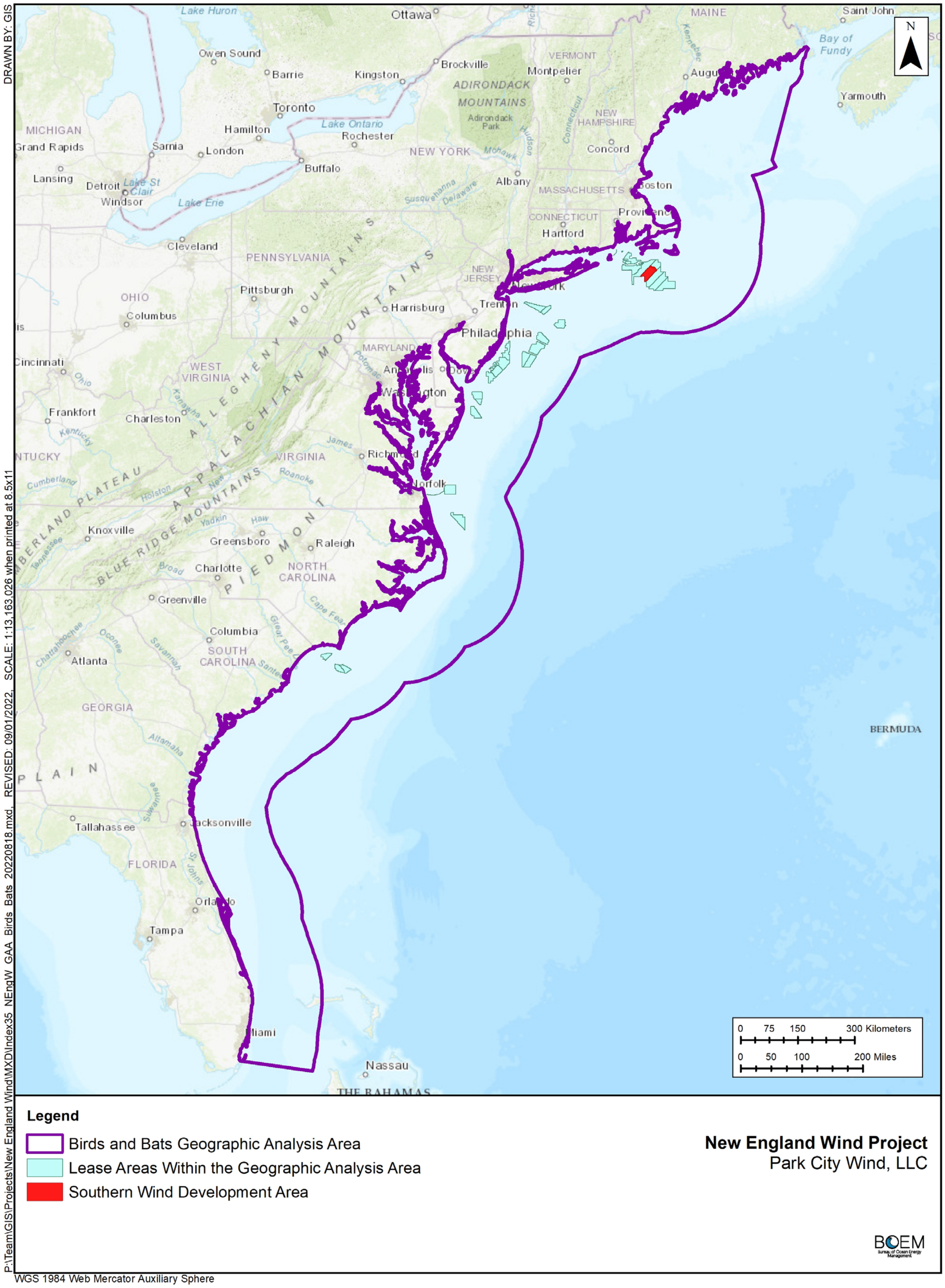



**Figure G.2.4-1: Geographic Analysis Area for Birds**

Any future proposed project in the RI/MA Lease Areas would be required to address ESA-listed species at the individual project scale and cumulatively. Additionally, BOEM is currently developing a programmatic ESA consultation with the USFWS to address the potential impacts of future Atlantic OCS offshore wind energy facilities on ESA-listed species.

Bald Eagles (*Haliaeetus leucocephalus*), which are listed as threatened in Massachusetts, are also federally protected by the Bald and Golden Eagle Protection Act (16 USC § 668 et seq.), as are Golden Eagles (*Aquila chrysaetos*). Bald Eagles are year-round residents in Massachusetts and occur in a variety of terrestrial environments, typically near water such as coastlines, rivers, and large lakes (BOEM 2012; USFWS 2011). Golden Eagles are rarely seen in the Cape Cod area, but small numbers of individuals migrate through on occasion (eBird 2022). Bald and Golden Eagles typically migrate over land, well inland of all proposed Project facilities (BOEM 2012).

Bald and Golden Eagles are not expected to occur in the offshore portion of the proposed Project area, but some potential exists for impacts (displacement due to noise, habitat loss/modification, and injury/mortality due to contact with construction equipment) resulting from construction, operations, and decommissioning of the onshore facilities. More information on Bald and Golden Eagles use of the proposed Project area is available in the COP (Volume III, Section 6.2.1.5.5; Epsilon 2022).

***Migrating Birds***

Many bird species do not normally reside along the Atlantic coast of North America but pass through during spring migration to more northern breeding habitats and/or fall migration to wintering areas. The Atlantic Flyway, which follows the Atlantic coast, is an important migratory 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 Project are located within the Atlantic Flyway. Bird species using the flyway during spring and fall migration 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. Migrating birds are protected under the Migratory Bird Treaty Act of 1918 (MBTA). Chapter 4 of the Atlantic Final Programmatic EIS (BOEM 2014) discusses the use of Atlantic coast habitats by migratory birds. 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. Under Section 3 of Executive Order 13186, BOEM and the USFWS established a Memorandum of Understanding (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-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 on migratory birds and design or implement measures to avoid, minimize, and mitigate such impacts as appropriate (MMS-USFWS 2009; BOEM Undated).

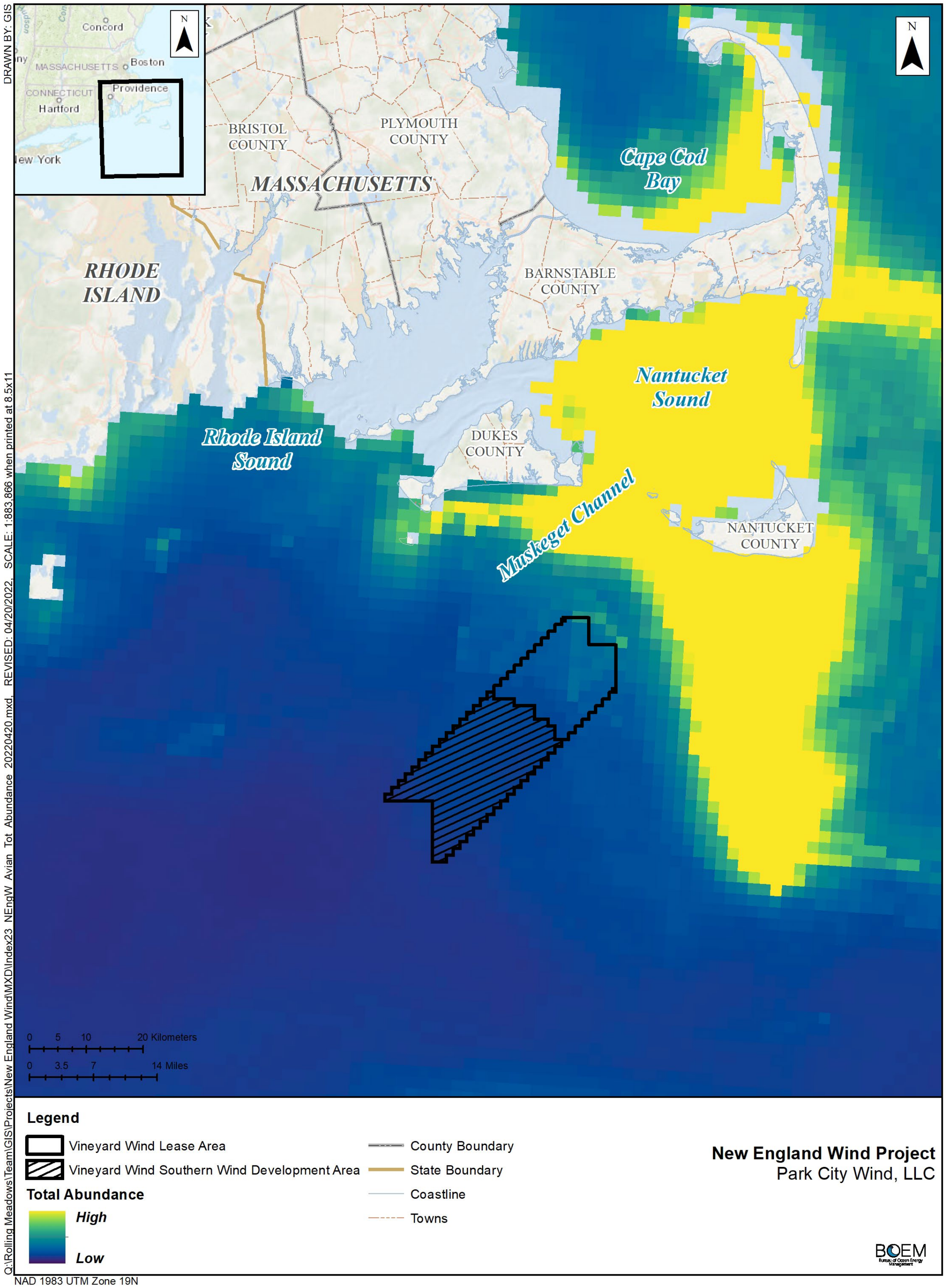
BOEM funds scientific studies and partners with the USFWS to better understand how migratory birds use the Atlantic OCS and refine the understanding of the risks from development to migratory species (BOEM Undated). BOEM uses information from these studies, coordination with the USFWS, and the scientific literature to avoid leasing areas with high concentrations of migratory birds that are most vulnerable to offshore wind development. For example, BOEM’s stakeholder engagement during the delineation of the Massachusetts Wind Energy Area resulted in the exclusion of 14 OCS blocks that overlapped with high value sea duck habitat (BOEM 2012).

BOEM worked with the USFWS to develop standard operating conditions (SOC) for commercial leases as terms and conditions of plan approval. These SOC are intended to ensure that the potential for impacts on birds is minimized. The SOCs have been analyzed in recent environmental assessments and consultations for lease issuance and site assessment activities, as well as BOEM's approval of the Coastal Virginia Offshore Wind Technology Advancement Project (BOEM 2015). Some of the SOCs originated from BMPs adopted in the Record of Decision for the 2007 *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf* (MMS 2007). Finally, BOEM and the USFWS work with the lessees to develop post-construction plans aimed at monitoring the effectiveness of measures considered necessary to minimize impacts on migratory birds with the flexibility to consider the need for modifications or additions to the measures.

As discussed above, the Atlantic Flyway is an important migratory pathway for as many as 164 species of waterbirds and a similar number of land birds, with the greatest volume of birds using the Atlantic Flyway as a movement corridor during annual migrations between wintering and breeding grounds (Watts 2010). Within the Atlantic Flyway in North America, 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 OCS, while land birds tend to use a wider corridor extending from the coastline to tens of kilometers inland (Watts 2010). While both groups may occur over land or water within the flyway and extend considerable distances from shore, the highest diversity and density is centered on the shoreline. Building on this information, Robinson Wilmott et al. (2013) evaluated the sensitivity of bird resources to collision and/or displacement from 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) and consistent with Garthe and Hüppop (2004), Furness and Wade (2012), and Furness et al. (2013), Atlantic OCS avian species with high scores for sensitivity for collision include gulls, jaegers, and the Northern Gannet (*Morus bassanus*). In many cases, high collision sensitivity ratings were driven by high occurrence on the OCS, low avoidance rates with high uncertainty, and time spent in the rotor swept zone. Many of the species addressed in Robinson Willmott et al. (2013) that had low collision sensitivity include passerines that spend very little time on the Atlantic OCS during migration and typically fly above the rotor swept zone. As discussed in BOEM 2012, 55 species may be expected to have some level of potential overlap with the SWDA and could potentially encounter operating WTGs on the Atlantic OCS. In general, the abundance of bird species that overlap with future wind energy facilities on the Atlantic OCS is relatively small. Figure G.2.4-2 illustrates that areas modeled for highest marine bird abundances are primarily outside the SWDA.

As described above, of the 177 species that may occur along the Atlantic coast, 55 have some potential to encounter WTGs associated with offshore wind development. Of these, 47 marine bird species have sufficient survey data to calculate the modeled percentage of a species population that would overlap with future 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 percent (Table G.2.4-1). BOEM assumes that the 47 species (85 percent) 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.




Sources: Curtice et al. 2019; Northeast Ocean Data 2019; Winship et al. 2018

**Figure G.2.4-2: Total Avian Relative Abundance Distribution Map**

**Table G.2.4-1: Percentage of Each Atlantic Seabird Population that Overlaps with Planned Offshore Wind Energy Development on the Outer Continental Shelf by Season**

| Species | Spring | Summer | Fall | Winter |
|---|---|---|---|---|
| Artic Tern (*Sterna paradisaea*) | NA | 0.2 | NA | NA |
| Atlantic Puffin (*Fratercula arctica*)[a] | 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*) | NA | 0.3 | NA | NA |
| Black-legged Kittiwake (*Rissa tridactyla*)[a] | 0.7 | NA | 0.7 | 0.5 |
| Black Scoter (*Melanitta americana*) | 0.2 | NA | 0.4 | 0.5 |
| Bonaparte’s Gull (*Chroicocephalus philadelphia*) | 0.5 | NA | 0.4 | 0.3 |
| Brown Pelican (*Pelecanus occidentalis*) | 0.1 | 0.0 | 0.0 | 0.0 |
| Band-rumped Storm-Petrel (*Oceanodroma castro*) | NA | 0.0 | NA | NA |
| Bridled Tern (*Onychoprion anaethetus*) | NA | 0.1 | 0.1 | NA |
| Common Eider (*Somateria mollissima*)[a] | 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 | NA | NA | 1.9 |
| Common Tern (*Sterna hirundo*)[a] | 2.1 | 3.0 | 0.5 | NA |
| Cory’s Shearwater (*Calonectris borealis*) | 0.1 | 0.9 | 0.3 | NA |
| 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*)[a] | 1.3 | 0.5 | 0.7 | 0.6 |
| Great Shearwater (*Puffinus gravis*) | 0.1 | 0.3 | 0.3 | 0.1 |
| Great Skua (*Stercorarius skua*) | NA | NA | 0.1 | NA |
| Herring Gull (*Larus argentatus*)[a] | 1.0 | 1.3 | 0.9 | 0.5 |
| Horned Grebe (*Podiceps auritus*) | NA | NA | NA | 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 | NA |
| Least Tern (*Sternula antillarum*) | NA | 0.3 | 0.0 | NA |
| Long-tailed Ducks (*Clangula hyemalis*) | 0.6 | 0.0 | 0.4 | 0.5 |
| Manx Shearwater (*Puffinus puffinus*)[a] | 0.0 | 0.5 | 0.1 | NA |
| Northern Fulmar (*Fulmarus glacialis*)[a] | 0.1 | 0.2 | 0.1 | 0.2 |
| Northern Gannet (*Morus bassanus*)[a] | 1.5 | 0.4 | 1.4 | 1.4 |
| Parasitic Jaeger (*Stercorarius parasiticus*) | 0.4 | 0.5 | 0.4 | NA |
| Pomarine Jaeger (*Stercorarius pomarinus*) | 0.1 | 0.3 | 0.2 | NA |
| Razorbill (*Alca torda*)[a] | 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 | NA | NA | 0.7 |
| Red Phalarope (*Phalaropus fulicarius*) | 0.4 | 0.4 | 0.2 | NA |
| Red-necked Phalarope (*Phalaropus lobatus*) | 0.3 | 0.3 | 0.2 | NA |
| Roseate Tern (*Sterna dougallii*) | 0.6 | 0.0 | 0.5 | NA |
| Royal Tern (*Thalasseus maximus*) | 0.0 | 0.2 | 0.1 | NA |
| Red-throated Loon (*Gavia stellate*)[a] | 1.6 | NA | 0.5 | 1.0 |
| Sooty Shearwater (*Ardenna grisea*) | 0.3 | 0.4 | 0.2 | NA |
| Sooty Tern (*Onychoprion fuscatus*) | 0.0 | 0.0 | NA | NA |
| South Polar Skua (*Stercorarius maccormicki*) | NA | 0.2 | 0.1 | NA |
| Surf Scoter (*Melanitta perspicillata*) | 1.2 | NA | 0.4 | 0.5 |
| Thick-billed Murre (*Uria lomvia*) | 0.1 | NA | NA | 0.1 |
| Wilson’s Storm-Petrel (*Oceanites oceanicus*) | 0.2 | 0.9 | 0.2 | NA |
| White-winged Scoter (*Melanitta deglandi*) | 0.7 | NA | 0.2 | 1.3 |

Source: These data were calculated from Winship et al. 2018.

NA = not applicable
[a] This includes species used in collision risk modeling.

***Offshore Birds***

Along the Atlantic coast, bird species abundance and species diversity generally decrease as distance from shore increases (Petersen et al. 2006; Paton et al. 2010; Watts 2010). The closest WTG for the proposed Project would be approximately 21 miles from shore in an area that has been part of a detailed resource assessment, including a review of bird resources (BOEM 2012, 2015); the RI/MA Lease Areas excludes areas of important offshore sea duck habitat (BOEM 2012; White and Veit 2020). As such, avian use of offshore habitats in the region is well documented and has been further refined with site-specific surveys (Veit et al. 2015, 2016; Winship et al. 2018; White and Veit 2020). The most likely species to occur within the offshore portions of the proposed Project include 22 species of gulls and terns, 17 species of sea ducks, 9 species of shearwaters and petrels, 4 species of loons and grebes, and 3 species of gannets and cormorants. Additional species may also occur in lower numbers (BOEM 2012). The COP describes each bird species likely to occur offshore Massachusetts (Volume III, Tables 6.2-6; Epsilon 2022).

Birds in the geographic analysis area are subject to pressure from ongoing activities, particularly accidental releases, cable emplacement and maintenance, presence of structures, and climate change. More than one-third of bird species that occur in North America (37 percent; 432 species) are at risk of extinction unless significant conservation actions are taken (NABCI 2016). This is likely representative of the conditions of birds within the geographic analysis area. 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 by-catch (approximately 2,600 seabirds killed annually on the Atlantic [Hatch 2017; Sigourney et al. 2019]), and climate change, which have the potential to affect bird species. Inland birds are discussed in EIS Section G.2.5, Terrestrial Habitats and Fauna.

### G.2.4.2 Environmental Consequences

Definitions of impact levels for birds are described in Table G.2.4-2.

**Table G.2.4-2: Impact Level Definitions for Birds**

| Impact Level | Impact Level | Definition |
|---|---|---|
| Negligible | Adverse | Impacts would be so small as to be unmeasurable. |
| | Beneficial | Impacts would be so small as to be unmeasurable. |
| Minor | Adverse | Most impacts would be avoided; if impacts occur, the loss of one or few individuals or temporary alteration of habitat could represent a minor impact, depending on the time of year and number of individuals involved. |
| | Beneficial | Impacts would be localized to a small area but with some measurable effect on one or a few individuals or habitat. |
| Moderate | Adverse | Impacts would be unavoidable but would not result in population-level impacts or threaten overall habitat function. |
| | Beneficial | Impacts would affect more than a few individuals in a broad area but not regionally and would not result in population-level impacts. |
| Major | Adverse | Impacts would result in severe, long-term habitat or population-level impacts on species. |
| | Beneficial | Long-term beneficial population-level impacts would occur. |

**Impacts of Alternative A – No Action Alternative on Birds**

When analyzing the impacts of Alternative A on birds, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the existing conditions for birds resources (Table G.1-17). The cumulative impacts of Alternative A considered the impacts of Alternative A in combination with other planned non-offshore wind and offshore wind activities, as described in EIS Appendix E, Planned Activities Scenario.

Under Alternative A, existing conditions for birds described in Section G.2.4.1 would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore wind activities within the geographic analysis area that contribute to impacts on birds include ongoing activities on the OCS that have the potential to result in continuing temporary to permanent impacts (disturbance, displacement, injury, mortality, habitat degradation, habitat conversion) on birds using the offshore portions of the OCS regardless of the offshore wind industry. Ongoing activities, especially interactions with commercial fisheries, anthropogenic light in the coastal and offshore environment, and climate change would continue. In addition to ongoing activities, the impacts of planned activities other than offshore wind development would include new submarine cables and pipelines, increasing onshore construction, marine minerals extraction, port expansions, and the installation of new structures on the OCS (Table G.1-18).

Ongoing offshore wind activities within the geographic analysis area that contribute to impacts on birds include continued operation of the Block Island Wind Farm, as well as ongoing construction of Vineyard Wind 1 in OCS-A 0501 and the South Fork Wind Project in OCS-A 0517. Ongoing operation of the Block Island Wind Farm and ongoing construction of Vineyard Wind 1 and South Fork Wind Project, along with planned offshore wind activities, would affect commercial fisheries and for-hire recreational fishing through the primary IPFs described below.

**Cumulative Impacts**

The cumulative impact analysis for Alternative A considers the impacts of Alternative A in combination with other planned non-offshore wind activities and planned offshore wind activities (other than Alternative B). Future offshore wind development activities would affect birds through the following primary IPFs.

**Accidental releases:** Accidental releases of fuel/fluids/hazardous materials, sediment, and/or trash and debris may increase as a result of future offshore wind activities. EIS Section G.2.2, Water Quality, discusses the amount and nature of substances in WTGs and ESPs that could be released. The risk of any type of accidental release would be increased primarily during construction but also during operations and decommissioning of offshore wind facilities.

Ingestion of hazardous materials could have lethal and sublethal impacts on birds, including 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 oiling of feathers can lead to sublethal impacts 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). Based on the volumes potentially involved, the likely amount of releases associated with future offshore wind development would fall within the range of accidental releases that already occur on an ongoing basis from non-offshore wind activities.

Trash and debris may be released by vessels during construction, operations, and decommissioning of offshore wind facilities. BOEM assumes all vessels would comply with laws and regulations to minimize releases. In the unlikely event of a release, it would be an accidental localized event in the vicinity of individual vessels within wind development areas. Accidentally released trash may be ingested by birds that mistake it for prey. Lethal and sublethal impacts on individuals could occur as a result of blockages caused by both hard and soft plastic debris (Roman et al. 2019), although accidental trash releases from Project vessels would be rare events.

Because the overall impact of accidental releases on birds is anticipated to be localized and short term, accidental releases of trash and debris would not appreciably contribute to overall impacts on birds. Further, while future offshore wind activities would contribute to an increased risk of spills and associated impacts due to fuel, fluid, or hazardous materials exposure, the contribution from future offshore wind activities would be a low percentage of the overall spill risk from ongoing activities that occur on the OCS.

**Cable emplacement and maintenance:** Emplacement of submarine cables would generally result in increased suspended sediments that may impact diving birds and result in displacement of foraging individuals or decreased foraging success and have impacts on some prey species (Cook and Burton 2010). Using the assumptions in Table E-1, the total area of seafloor disturbed by offshore export, inter-array, and inter-link cables for offshore wind facilities (excluding the proposed Project) in the geographic analysis area would be up to 63,846 acres (of the roughly 193 million acres of seafloor habitat potentially available in the geographic analysis area for birds), although only a fraction of this total area would be actively disturbed at any single time. All habitat impacts associated with cable emplacement and maintenance would be localized, and turbidity would be present during installation for 1 to 6 hours at a time. Any dredging necessary prior to cable installation could also contribute to additional impacts. New offshore submarine cables associated with Alternative A would cause short-term disturbance of seafloor habitats and injury and mortality of bird prey species in the immediate vicinity of the cable emplacement activities. Disturbed seafloor from construction of future offshore wind projects may affect some bird prey species; however, assuming future projects use installation procedures similar to those planned for the proposed Project, the duration and extent of impacts would be limited and short term, and benthic assemblages would recover from disturbance (EIS Section 3.4, Benthic Resources, and EIS Section 3.6, Finfish, Invertebrates, and Essential Fish Habitat, provide more information). Given that impacts would be temporary and generally localized to the emplacement corridor, no population-level impacts on birds would be expected. The offshore wind projects included in Alternative A (Table E-1) would primarily be constructed between 2022 and 2030 (and possibly beyond, in the case of some projects in the New York Bight and Carolina Long Bay areas), and construction impacts from multiple projects could overlap in time and space and could potentially result in greater impacts. No population-level impacts would be anticipated because birds would be able to successfully forage in adjacent areas not affected by increased suspended sediments. Migrating birds that are not actively foraging would not be affected by this IPF.

**Climate change**: Several sub-IPFs are related to climate change, including increased storm severity and frequency, ocean acidification, altered migration patterns, increased disease frequency, protective measures (e.g., barriers and seawalls), and increased erosion and sediment deposition. These factors have the potential to result in long-term, potentially high-consequence, risks to birds via, for example, changes in prey abundance and distribution, changes in nesting and foraging habitat abundance and distribution, and changes to migration patterns and timing. EIS Section G.2.1, Air Quality, provides more details on the expected contribution of offshore wind on climate change.

**Lighting:** Offshore wind development would result in additional light from vessels and offshore structures at night. Ocean vessels have an array of lights including navigational lights and deck lights. Such lights can attract nocturnal migrant birds, primarily during nighttime construction activities but also during operations and decommissioning. Attraction to project vessels by birds would not be expected to result in increased risk of collision with vessels given the distance from shore and the expected limited use of the SWDA. The resulting vessel-related lighting impacts would be localized around individual vessels and temporary. In a maximum-case scenario, lights could be on 24 hours per day during construction. This could attract birds, and/or potential prey species, to construction zones, potentially exposing them to greater harm from accidental releases associated with construction activities.

Up to 2,955 WTGs and ESPs with navigational and Federal Aviation Administration (FAA) hazard lighting would be constructed within the geographic analysis area for birds (excluding the proposed Project), where few lighted structures currently exist. This lighting has some potential to result in long-term impacts on species that have potential to encounter operating WTGs and may pose an increased collision risk to migrating birds (Hüppop et al. 2006), although this risk would be minimized through the use of red flashing FAA lighting (BOEM 2019b; Kerlinger et al. 2010). WTG lighting could result in new incremental collision risk for birds, particularly to night flying migrants during low-visibility weather conditions where few lighted structures currently exist on the OCS. Other offshore wind projects will use an aircraft detection light system (ADLS), which will only activate FAA lighting when an aircraft approaches, and these impacts would be substantially reduced.

**Noise:** Anthropogenic noise on the OCS associated with future offshore wind development, including noise from aircraft, pile-driving activities, geological and geophysical (G&G) surveys, offshore construction, and vessel traffic, has the potential to impact birds on the OCS. Additionally, onshore construction noise has the potential to impact birds. These impacts would be localized and temporary. Potential impacts associated with greater energy expenditure could be greater if avoidance behavior and displacement of birds occurs during seasonal migration periods but would not be expected to be biologically significant.

Fixed and rotary wing aircraft may be used to transport construction and operations crews and would continue to be used for ongoing inland bird monitoring surveys, although the anticipated level of use would be low, and restrictions on low-flying aircraft may be imposed. If flights are at a sufficiently low altitude, birds may flush, resulting in increased energy expenditure. Disturbance, if any, would be temporary and localized, with impacts dissipating once the aircraft has left the area. No individual or population-level impacts would be expected.

Noise from construction of WTGs and ESPs may temporarily affect diving birds. The greatest impact of noise is likely to be caused by pile-driving activities, which would occur during construction for up to 4 to 6 hours at a time from 2022 through 2030 and possibly beyond. Noise transmitted through water has the potential to result in temporary displacement of diving birds in a limited space around each pile and can cause short-term stress and behavioral changes ranging from mild annoyance to escape behavior (BOEM 2014b, 2016a). Additionally, impacts on prey species may affect foraging success (Table G.1-5). The extent of impacts would depend on pile size, hammer energy, and local acoustic conditions. Similar to pile-driving, G&G site characterization surveys for offshore wind facilities would create high-intensity impulsive noise around sites of investigation, leading to similar impacts. The extent depends on equipment used, noise levels, and local acoustic conditions. G&G noise would occur intermittently over an assumed 2- to 10-year period.

Noise associated with project vessels could disturb some individual diving birds, although these individuals would likely acclimate to the noise or move away, potentially resulting in a temporary loss of habitat (BOEM 2012). Brief, temporary responses, if any, would dissipate once the vessel has passed or the individual has moved away. No individual fitness or population-level impacts would be expected.

Noise associated with construction of onshore project components may also have localized and temporary impacts, including avoidance and displacement, although no individual fitness or population-level impacts would be expected.

**Presence of structures:** The presence of structures under Alternative A could have both beneficial and adverse impacts on birds through fish aggregation and 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. Up to 2,955 WTG and ESP foundations, which would entail 43,526 acres of new scour protection for foundations and hard protection atop cables, would be constructed in the geographic analysis area for birds (compared to more than 193 million acres in the geographic analysis area) where few such structures exist. Structures would be added intermittently between 2022 and 2030 and beyond and that these structures would remain until decommissioning of each facility is complete, approximately 30 years following construction.

In the northeast and mid-Atlantic waters, there are approximately 2,570 seabird fatalities through interaction with commercial fishing gear each year, of which 84 percent are with gillnets involving shearwaters/fulmars and loons (Hatch 2017). Abandoned or lost fishing nets from commercial fishing may get tangled with foundations, reducing the chance that abandoned gear would cause additional harm to birds if left to drift until sinking or washing ashore. A reduction in drifting derelict fishing gear (in this case by entanglement with foundations) would have a beneficial impact on bird populations (Regular et al. 2013). In contrast, the presence of structures could also increase recreational fishing activity (EIS Section 3.9, Commercial Fisheries and For-Hire Recreational Fishing), thus exposing individual birds to harm from fishing line and hooks. This intermittent impact would persist for the anticipated 30-year life of the proposed Project until decommissioning is complete.

The presence of new structures could increase prey items for some marine bird species. WTG and ESP foundations could increase the mixing of surface waters and deepen the thermocline, possibly increasing pelagic productivity in local areas (English et al. 2017). Additionally, 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 few years 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 (Raoux et al. 2017; Pezy et al. 2018; 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. 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.

The uniform 1-nautical-mile (1.9-kilometer, 1.15-mile) WTG spacing in the RI/MA Lease Areas would provide ample space between WTGs for birds that are not flying above WTGs to fly through the wind array without changing course or by making minor course corrections to avoid operating WTGs. Course corrections made by migratory birds to avoid a project or individual WTG would result in miniscule additional flight distances compared to the distances traveled during seasonal long-distance migrations. Impacts of additional energy expenditure due to minor course corrections or complete avoidance of wind development areas would not be expected to be biologically significant, and no individual fitness or population-level impacts would be expected.

The greatest risk to birds associated with future offshore wind development would be fatal interactions with spinning WTGs. There could be additional collision risk to birds if non-operational WTGs are lighted. In the contiguous United States, bird collisions with operating WTGs are a relatively rare event, with an estimated 140,000 to 328,000 (with a mean of 234,000) birds reported killed annually by 44,577 onshore turbines (Loss et al. 2013, Erickson et al. 2014). Actual mortality rates are likely higher because of (inadequate) strike detection methods, variable scavenger rates, and other challenges in survey ; nevertheless, these studies represent the best available science in estimating collision mortality of North American bird species. Estimating avian mortality at an onshore wind facility is relatively straightforward and is based on counts of bodies discovered during ground searches, statistically adjusted upward to account for searcher efficiency and scavenging rates.

It is extremely difficult to record fatality events in the offshore environment; further, in these events, the victim was rarely identified to species. Siting projects away from areas with high concentrations of birds and vulnerable populations is the most effective way to minimize impacts on avian resources on the OCS. To this end, several OCS blocks were removed from the Massachusetts call area to avoid high value sea duck habitat and minimize impacts on these species (BOEM 2012, 2014b). Based solely on a minimum estimated mean annual mortality rate of 6.9 birds per turbine in the eastern United States (Loss et al. 2013), an estimated 13,945 birds could be killed annually by Alternative A WTGs. This estimate likely significantly overstates the actual mortality rate of Alternative A for several reasons. Approximately 75 percent of the documented onshore mortality is composed of groups (small passerines, diurnal raptors, doves, pigeons, and upland game birds) that would not be expected to frequently encounter offshore WTGs in large numbers. In addition, factors such as landscape features and weather patterns that influence collision risk are different on the OCS than at onshore wind facilities.

Empirical studies also suggest that bird fatalities due to collision with offshore turbines are rare. For instance, unlike the planned development on the Atlantic OCS, the majority of the offshore wind development in Europe is relatively close to shore, where bird densities tend to be greater—in part due to closer proximity to some nesting colonies. In addition, the European wind energy facilities that are further from shore (e.g., North Sea) are usually between large land masses, thus creating more opportunities for birds to move between land masses. Using data from radar and thermal imaging to inform a stochastic collision risk model (CRM), 47 out of 235,136 migrating sea ducks were predicted to collide with 72 offshore wind turbines each year at the Nysted Wind Farm off Denmark (Desholm 2006)—or 0.7 bird per turbine. After reviewing 20 months of camera footage, six gulls were observed colliding with two turbines at the Thanet Wind Farm off England (Skov et al. 2018)—or 3.6 birds per turbine per year. The area studied has approximately 3 to 10 times more gulls than the SWDA (Royal Haskoning 2013; COP Appendix III-C, Table 3-2; Epsilon 2022).

Another approach to estimate collision fatalities uses a CRM. Collision modeling is used at the project level to predict the number of fatalities of marine bird species in Europe and the United States (BOEM 2015, 2019b). Model inputs (e.g., monthly bird densities, flight behavior, avoidance behavior, turbine specifications) are used to determine the estimated number of annual collisions with operating WTGs. Due to inherent data limitations, these models often represent only a subset of species potentially present and are for a subset of marine bird populations that are vulnerable to collisions (based on Robinson Willmott et al. [2013]). The following modeling analysis estimates the hypothetical number of seabird fatalities from Alternative A. This analysis is not intended to quantify the exact number of fatalities associated with Alternative A or with Atlantic offshore wind energy facilities, but rather to explore the relative number of fatalities using species that have sufficient information to run CRMs.

Modeling of the collision risk associated with Alternative A for Vineyard Wind 1 used the Avian Stochastic CRM (v 2.3.2) model (BOEM 2019c).[3] Twelve seabird species were identified as occurring on the Atlantic OCS with modeled flight height distributions from Johnston et al. (2014). This wide range of marine bird species spans five taxonomic orders: Anseriformes, Charadriiformes, Gaviiformes, Procellariiformes, and Suliformes. Selected key model inputs for each species are provided in Table G.2.4-3. Only observations identified to species were used. The proportions of flying birds by species were calculated from the data from each survey effort in the Northwest Atlantic Seabird Catalog (O'Connell et al. 2009) and summarized in Table G.2.4-4. These proportions were multiplied by the observed monthly density of birds in each region, and then the mean monthly density of flying birds and standard deviation (Table G.2.4-5) was calculated across regions.

**Table G.2.4-3: Model Inputs for Each Species[a]**

| Species | Avoidance[x] | Body Length (inches) | Wingspan (inches) | Flight Speed (miles per hour) | Nocturnal Activity[i] |
|---|---|---|---|---|---|
| Black-legged Kittiwake (*Rissa tridactyla*) | 0.967 (0.002) | 15.4 (0.2) | 42.5 (1.6) | 16.2 (3.4) | 0.033 (0.0045) |
| Common Eider (*Somateria mollissima*) | 0.98 | 23.8 | 38.2 | 42.5 (3.6) | 0 |
| Northern Fulmar (*Fulmarus glacialis*) | 0.98 | 17.7 (1.0) | 42.1 (1.0) | 29.1 (6.3) | 0.7 |
| Razorbill (*Alca torda*) | 0.98 | 15.0 (0.2) | 26.0 (0.5) | 35.8 (5.6) | 0.1 |
| Red-throated Loon (*Gavia stellate*) | 0.98 | 24.0 (1.6) | 43.7 (1.0) | 46.1 (3.3) | 0.1 |
| Common Tern (*Sterna hirundo*) | 0.98 | 13.0 (0.4) | 34.6 (2.1) | 24.6 (4.1)[b] | 0.28 (0.07)[c] |
| Great Black-backed Gull (*Larus marinus*) | 0.996 (0.011)[d] | 28.0 (1.4) | 62.2 (1.5) | 21.9 (8.1)[d] | 0.5[e] |
| Herring Gull (*Larus argentatus*) | 0.999 (0.005)[d] | 23.4 (0.9) | 56.7 (1.2) | 21.9 (8.1)[d] | 0.5[e] |
| Northern Gannet (*Morus bassanus*) | 0.999 (0.003)[d] | 36.8 (1.3) | 68.1 (1.5) | 29.8 (9.5)[d] | 0.03[f] |
| Lesser Black-backed Gull (*Larus fuscus*) | 99.8[d] | 22.8 | 52.8[b] | 19.5[d] | 3.0[g] |
| Atlantic Puffin (*Fratercula arctica*) | 0.98 | 10.8 (0.3) | 21.7 (1.6) | 39.4 (7.2)[h] | 0.10[e] |
| Manx Shearwater (*Puffinus puffinus*) | 0.98 | 13.4 (0.1) | 32.7 (1.3) | 25.3 | 0.5[e] |

[x] This is the conditional probability of avoiding a turbine blade for the extended model.
[a] Mean (1 Standard Deviation) values in parentheses: Avoidance extended, body length, and wingspan were set to default values unless otherwise noted. Half of the flights were upwind, and all birds were flapping (except Manx Shearwater).
[b] Pennycuick et al. 2013
[c] Loring et al. 2019
[d] Skov et al. 2018
[e] Robinson Willmott et al. 2013
[f] Furness et al. 2018
[g] Garthe and Hüppop 2004
[h] Pennycuick 1990
i This is the proportion of time spent flying at night.

[3] Although some of the assumed characteristics of offshore wind projects in Alternative A have changed since publication of the Vineyard Wind 1 EIS (BOEM 2021a), these differences are relatively small in context of the entire array, and the findings of the EIS are assumed to be broadly relevant to this analysis.

**Table G.2.4-4: Proportion of Birds Flying by Survey Effort Calculated Data in the Northwest Atlantic Seabird Catalog[a]**

| Species | Rhode Island Ocean Special Area Management Plan Boats Surveys | Massachusetts Clean Energy Center Aerial Surveys | New York State Energy Research and Development Authority Hi-Resolution Aerial Surveys | New Jersey Ecological Existing Boat Surveys | Mid-Atlantic Boat Surveys |
|---|---|---|---|---|---|
| Common Eider (*Somateria mollissima)* | 0.759 | 0.047 | ND | ND | ND |
| Red-throated Loon (*Gavia stellate*) | 0.891 | ND | 0.423 | 0.820 | 0.876 |
| Northern Fulmar (*Fulmarus glacialis*) | 0.000[b] | 0.692 | 0.667 | ND | ND |
| Manx Shearwater (*Puffinus puffinus*) | 0.200[b] | ND | ND | ND | 0.786 |
| Northern Gannet (*Morus bassanus*) | 0.874 | 0.673 | 0.297 | 0.779 | 0.755 |
| Black-legged Kittiwake (*Rissa tridactyla*) | 0.958 | 0.841 | 0.770 | 0.913 | ND |
| Lesser Black-backed Gull (*Larus fuscus*) | ND | ND | 0.395 | ND | ND |
| Herring Gull (*Larus argentatus*) | 0.904 | ND | 0.297 | 0.813 | 0.840 |
| Great Black-backed Gull (*Larus marinus*) | 0.780 | ND | 0.312 | 0.670 | 0.696 |
| Common Tern (*Sterna hirundo*) | 0.947 | ND | 0.953 | 0.985 | 0.918 |
| Razorbill (*Alca torda*) | 0.778 | 0.065 | 0.010 | 0.515 | 0.588 |
| Atlantic Puffin (*Fratercula arctica*) | 0.167[b] | ND | 0.010 | ND | ND |

ND = no data
[a] O'Connell et al. 2009; only observations that were identified to species were used.
[b] This indicates fewer than ten observations.

**Table G.2.4-5: Mean Density per Square Kilometer (1 Standard Deviation) of Flying Birds by Month across Regional Surveys That Were Used as Model Inputs**

| Species | January | February | March | April | May | June | July | August | September | October | November | December |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Common Eider (*Somateria mollissima*) | 0.026 (0.023) | 0.026 (0.023) | 0.003 (0.005) | 0.003 (0.005) | 0.003 (0.005) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.047 (0.001) | 0.047 (0.001) | 0.047 (0.001) | 0.026 (0.023) |
| Red-throated Loon (*Gavia stellate*) | 0.299 (0.393) | 0.299 (0.393) | 0.307 (0.324) | 0.299 (0.334) | 0.299 (0.334) | 0.001 (0.002) | 0.001 (0.002) | 0.010 (0.016) | 0.025 (0.007) | 0.025 (0.007) | 0.025 (0.007) | 0.299 (0.393) |
| Northern Fulmar (*Fulmarus glacialis*) | 0.028 (0.042) | 0.028 (0.042) | 0.006 (0.004) | 0.006 (0.005) | 0.006 (0.005) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.046 (0.057) | 0.046 (0.057) | 0.046 (0.057) | 0.028 (0.042) |
| Manx Shearwater (*Puffinus puffinus*) | 0.014 (0.024) | 0.014 (0.024) | 0.005 (0.006) | 0.005 (0.006) | 0.005 (0.006) | 0.004 (0.006) | 0.004 (0.006) | 0.004 (0.006) | 0.002 (0.002) | 0.002 (0.002) | 0.002 (0.002) | 0.014 (0.024) |
| Northern Gannet (*Morus bassanus*) | 1.940 (3.211) | 1.940 (3.211) | 1.007 (0.994) | 0.934 (1.070) | 0.934 (1.070) | 0.085 (0.151) | 0.085 (0.151) | 0.165 (0.310) | 0.712 (0.797) | 0.712 (0.797) | 0.712 (0.797) | 1.940 (3.211) |
| Black-legged Kittiwake (*Rissa tridactyla*) | 0.117 (0.203) | 0.117 (0.203) | 0.017 (0.029) | 0.017 (0.029) | 0.017 (0.029) | 0.000 (0.000) | 0.000 (0.000) | 0.010 (0.018) | 0.043 (0.029) | 0.043 (0.029) | 0.043 (0.029) | 0.117 (0.203) |
| Lesser Black-backed Gull (*Larus fuscus*) | 0.002 (-) | 0.002 (-) | 0.002 (-) | 0.001 (-) | 0.001 (-) | 0.000 (-) | 0.000 (-) | 0.000 (-) | 0.001 (-) | 0.001 (-) | 0.001 (-) | 0.002 (-) |
| Herring Gull (*Larus argentatus*) | 0.232 (0.112) | 0.232 (0.112) | 0.324 (0.113) | 0.253 (0.202) | 0.253 (0.202) | 0.052 (0.060) | 0.052 (0.060) | 0.076 (0.090) | 0.354 (0.401) | 0.354 (0.401) | 0.354 (0.401) | 0.232 (0.112) |
| Great Black-backed Gull (*Larus marinus*) | 0.160 (0.178) | 0.160 (0.178) | 0.098 (0.021) | 0.081 (0.050) | 0.081 (0.050) | 0.052 (0.056) | 0.052 (0.056) | 0.069 (0.066) | 0.204 (0.181) | 0.204 (0.181) | 0.204 (0.181) | 0.160 (0.178) |
| Common Tern (*Sterna hirundo*) | 0.000 (0.000) | 0.000 (0.000) | 0.366 (0.557) | 0.418 (0.510) | 0.418 (0.510) | 0.243 (0.252) | 0.243 (0.252) | 0.192 (0.211) | 0.101 (0.124) | 0.101 (0.124) | 0.101 (0.124) | 0.000 (0.000) |
| Razorbill (*Alca torda*) | 0.203 (0.308) | 0.172 (0.321) | 0.057 (0.044) | 0.056 (0.047) | 0.056 (0.047) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.003 (0.005) | 0.003 (0.005) | 0.003 (0.005) | 0.203 (0.308) |
| Atlantic Puffin (*Fratercula arctica*) | 0.003 (0.004) | 0.003 (0.004) | 0.006 (-) | 0.000 (-) | 0.000 (-) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.002 (0.003) | 0.002 (0.003) | 0.002 (0.003) | 0.003 (0.004) |

Source: Data calculated from O'Connell et al. 2009
"-"= not calculated

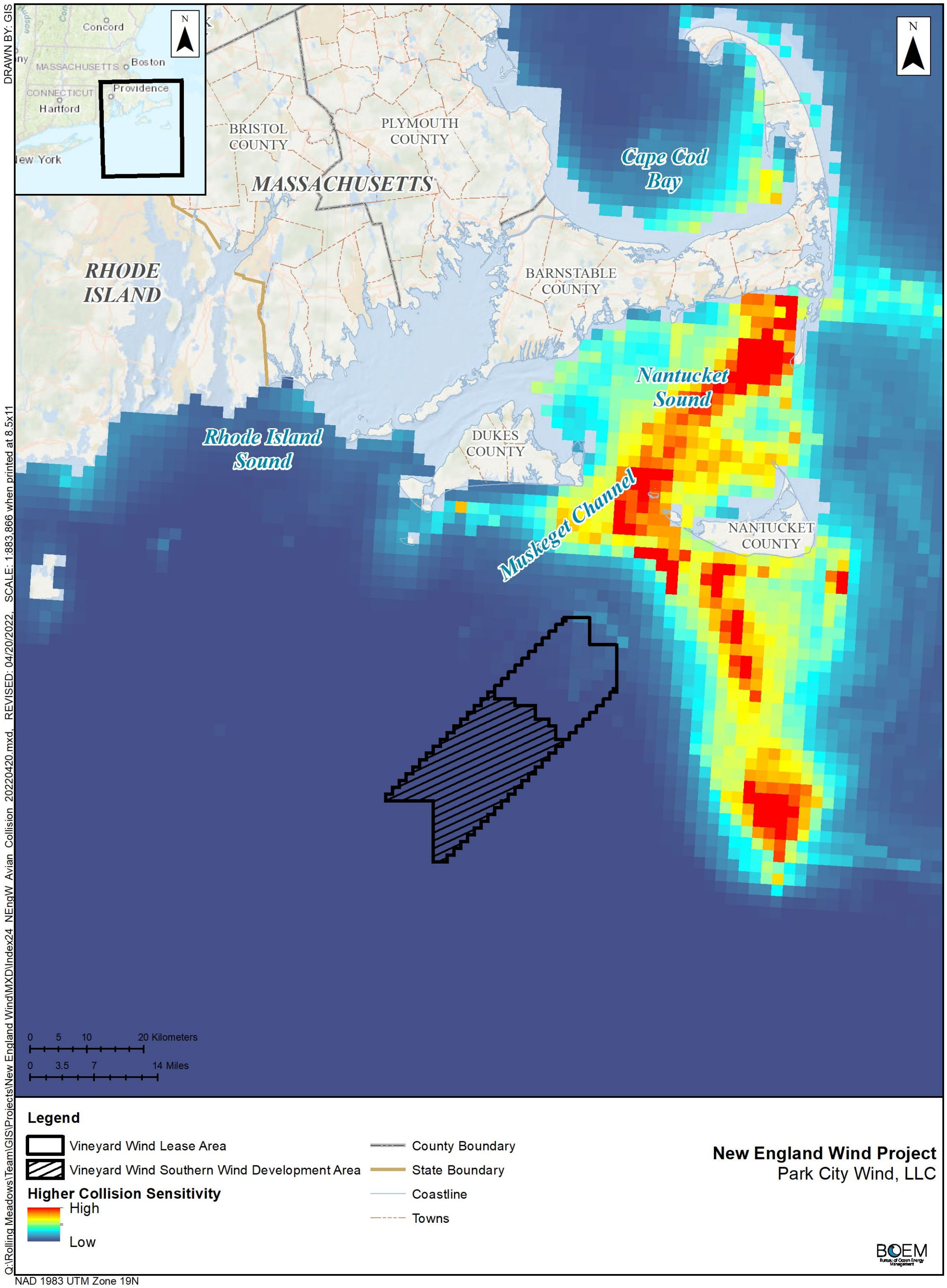
For Alternative A, the collision models predicted that 75 marine birds across the 12 modeled species would be killed each year. However, due to uncertainty in the data inputs (Table G.2.4-6), the modeled fatalities could be as high as 3,481 birds. Most of the variation in estimated fatalities is likely due to the relatively large amount of variation in monthly bird densities. Fatalities of Common Eider (*Somateria mollissima*) were predicted to be relatively greater than Common Tern (*Sterna hirundo*) and Red-throated Loon (*Gavia stellate*) (Table G.2.4-6). For the remaining species, modeled fatalities were predicted to be extremely low. Further, no Atlantic Puffin (*Fratercula arctica*) and Manx Shearwater (*Puffinus puffinus*) fatalities are expected because they are expected to fly below the rotor swept zone (less than 131 feet above the sea surface). The Avian Stochastic CRM was not valid for Lesser Black-backed Gulls (*Larus fuscus*), so the Band (2012) model was used instead; no fatalities were predicted for Lesser Black-backed Gulls by the Band model.

**Table G.2.4-6: Predicted Annual Number of Hypothetical Collision Fatalities on the Atlantic Outer Continental Shelf[a]**

| Species | Median[b] | 95% Confidence Interval |
|---|---|---|
| Atlantic Puffin (*Fratercula arctica*)[c] | 0 | NA |
| Black-legged Kittiwake (*Rissa tridactyla*) | 0 | 0–19 |
| Common Eider (*Somateria mollissima*) | 56 | 0–465 |
| Common Tern (*Sterna hirundo*) | 11 | 3–29 |
| Great Black-backed Gull (*Larus marinus*) | 2 | 0–1,006 |
| Herring Gull (*Larus argentatus*) | 0 | 0–349 |
| Lesser Black-backed Gull (*Larus fuscus*)[d] | 0 | NA |
| Manx Shearwater (*Puffinus puffinus*)[c] | 0 | NA |
| Northern Fulmar (*Fulmarus glacialis*) | 0 | 0–3 |
| Northern Gannet (*Morus bassanus*) | 0 | 0–247 |
| Razorbill (*Alca torda*) | 0 | 0–17 |
| Red-throated Loon (*Gavia stellate*) | 6 | 0–1,346 |

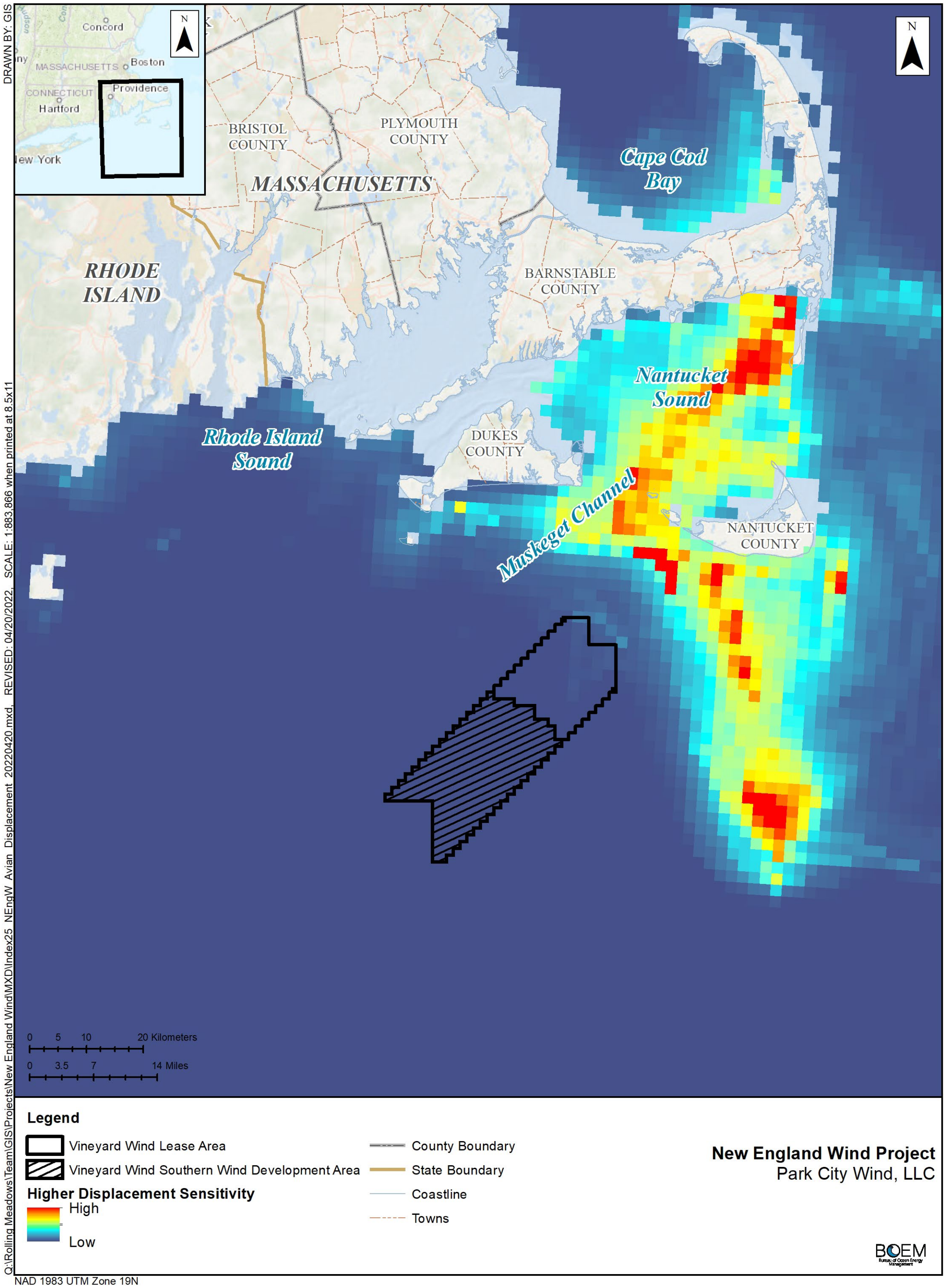
NA = not applicable
[a] This was calculated from the Avian Stochastic CRM (v2.3.2), using 12-MW turbines with 40-meter (131.2 foot) air gap. Output is from the Extended Model (Option 3). Monthly mean densities of flying birds were calculated across regional survey efforts.
[b] Fatality estimates are dependent on presence and density of birds. For example, Common Eiders are known to appear in large numbers clumped together but not always in the same exact place from one year to the next. This, in part, can help explain why it is possible to have zero fatalities; if there are no birds present, then the number of fatalities would be zero.
[c] The species flies below rotor swept zone and is, therefore, not at risk of collision with rotating turbine blades.
[d] When the stochastic model was not valid, the traditional Band model was used.

Due to inherent data limitations (e.g., species-specific data needed to complete Tables G.2.4-4 through G.2.4-6), fatality estimates are not available for every species that may encounter operating WTGs. As described above, BOEM believes that as many as 55 species of birds may have some potential to encounter operating WTGs on the Atlantic OCS. However, aerial surveys of the Massachusetts wind development areas conducted in all seasons from November 2011 to January 2015 identified only 25 species (Veit et al. 2016). Further, as shown in Veit et al. (2016), the mean densities of the 15 most commonly observed species (including all 12 species in Tables G.2.4-4 through G.2.4-6) were relatively low, as would be expected based on predicted species occurrence as modeled by the Marine-life Data and Analysis Team (Figure G.2.4-3 and Figure G.2.4-4). Additionally, the biological diversity of the modeled species provides a representative sample of the majority of marine bird species that would be expected to encounter operating WTGs in the RI/MA Lease Areas based on past surveys on the OCS.




Sources: Curtice et al. 2019; Northeast Ocean Data 2019; Winship et al. 2018

**Figure G.2.4-3: Total Avian Relative Abundance Distribution Map for the Higher Collision Sensitivity Species Group**




Source: Curtice et al. 2019; Northeast Ocean Data 2019; Winship et al. 2018

**Figure G.2.4-4: Total Avian Relative Abundance Distribution Map for the Higher Displacement Sensitivity Species Group**

Overall, annual bird mortality due to WTG interactions is generally expected to be relatively low. Generally, only a small percentage of individuals that occur or migrate along the Atlantic coast are expected to encounter the rotor swept area of one or more operating Alternative A WTGs. The addition of WTGs to the offshore environment may result in increased functional loss of habitat for those species with higher displacement sensitivity. However, 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). Furthermore, substantial foraging habitat for resident birds would remain available outside of the proposed offshore lease areas; therefore, no individual fitness or population-level impacts would occur.

**Traffic:** General aviation traffic accounts for approximately two bird strikes per 100,000 flights nationwide (Dolbeer et al. 2019). Because aircraft flights associated with offshore wind development are expected to be minimal in comparison to existing conditions, aircraft strikes with birds are highly unlikely. As such, aircraft traffic would not be expected to appreciably contribute to overall impacts on birds.

***Conclusions***

**Impacts of Alternative A.** Under Alternative A, birds would continue to follow current regional trends and respond to current and future environmental and societal activities. While the proposed Project would not be built under Alternative A, ongoing activities would have continuing temporary to permanent impacts on birds, primarily through the presence of structures. The impacts of ongoing activities would be **minor**, with **minor** beneficial impacts due to the presence of structures.

**Cumulative Impacts of Alternative A.** In addition to ongoing activities, planned activities may also contribute to impacts on birds. Considering all the IPFs together, Alternative A combined with ongoing and planned activities in the geographic analysis area would result in **moderate** cumulative impacts and could potentially include **moderate** beneficial impacts on foraging birds due to the presence of structures. The majority of offshore structures in the geographic analysis area would be attributable to the offshore wind development. Migratory birds that use the RI/MA Lease Areas during all or parts of the year would either be exposed to new collision risk or have long-term functional habitat loss due to behavioral avoidance and displacement. The offshore wind development would also be responsible for the majority of impacts related to cable emplacement and maintenance and noise, but impacts on birds resulting from these IPFs would be localized and temporary and would not be expected to be biologically significant.

The individual offshore wind projects in Alternative A may or may not include post-construction avian monitoring for migratory birds and ESA-listed species and annual mortality reporting that the applicant has committed to performing as part of Alternative B (EIS Appendix H, Mitigation and Monitoring). This monitoring could provide an understanding of the impacts of offshore wind development, benefit the future management of these species, and inform planning of other offshore development would not be conducted; however, ongoing and future surveys and monitoring could still supply similar data.

**Relevant Design Parameters and Potential Variances in Impacts**

The following proposed Project design parameters (EIS Appendix C, Project Design Envelope and Maximum-Case Scenario) would influence the magnitude of the impacts on birds:

- The number, size, and location of WTGs and ESPs;
- The type of lighting to be used; and
- The time of year construction occurs.

This assessment analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE (i.e., numbers and spacing of WTGs and ESPs, length of inter-array cable) or construction activities would be expected to result in similar or lower impacts than described below. The following sections summarize the potential impacts of Phases 1 and 2 of the proposed Project on birds. Routine activities associated with both proposed Project phases would include construction, operations, and decommissioning, as described in EIS Chapter 2, Alternatives. The most impactful IPF is expected to be the presence of structures, which could lead to impacts including injury and mortality or elicit an avoidance response. BOEM prepared a BA for the potential impacts on USFWS federally listed species, which found that the proposed Project was not likely to adversely affect listed bird species or designated critical habitat (BOEM 2022b).

**Impacts of Alternative B – Proposed Action on Birds**

This section identifies potential impacts of Alternative B on birds.

***Impacts of Phase 1***

Phase 1 would affect birds through the following primary IPFs during construction, operations, and decommissioning.

**Accidental releases:** As described in Table G.1-18, some potential for mortality, decreased fitness, and health impacts exist due to the accidental release of fuel, hazardous materials, and trash and debris from Phase 1 vessels. Operational waste from Phase 1 vessels could include bilge and ballast water, sanitary and domestic wastes, and trash and debris. All Phase 1 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 on bird species resulting from the release of debris, fuel, hazardous materials, or waste (BOEM 2012). Additionally, training and awareness of BMPs proposed for waste management and mitigation of marine debris would be required of proposed Project personnel, reducing 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; as such, there would be localized and temporary **negligible** impacts on birds.

**Cable emplacement and maintenance:** Phase 1 would disturb up to 278 acres of seafloor through cable installation and up to 67 acres by dredging prior to cable installation, resulting in turbidity impacts that have the potential to 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 generally localized to the emplacement corridor, extending up on 1.2 miles (EIS Section G.2.2). However, individual birds would be expected to successfully forage in nearby areas not affected by increased sedimentation during cable emplacement, and only non-measurable **negligible** impacts, if any, on individuals or populations would be expected due to the localized and temporary nature of the potential impacts. Based on the assumptions in Table E-1, cable installation from up to seven other offshore wind projects could overlap in time with Phase 1 in 2025. However, given the localized nature of these impacts, impacts associated with the emplacement of export and inter-array cabling of other offshore wind projects would not overlap spatially with Phase 1, and **negligible**, if any, impacts would be expected. Suspended sediment concentrations during activities other than dredging would be within the range of natural variability for this location. Any dredging necessary prior to cable installation could also generate additional impacts. Cable maintenance activities would result in similar impacts as cable emplacement and would also be expected to be **negligible.**

**Lighting:** The distance of the proposed Project's permanent structures from shore reduces the exposure of coastal birds to construction activities. To further minimize potential bird mortality from collision, the applicant would reduce lighting as much as is practicable during construction. Vessel lights during construction would be minimal and likely limited to vessels transiting to and from construction areas. In addition, whenever practicable, the applicant would use down-shield lighting or down-lighting to limit bird attraction and disorientation. To further reduce impacts on birds, when practicable, the applicant would reduce the number of lights, use low intensity lights, avoid white lights, use flashing lights where appropriate, and use lights only when necessary for work crews to minimize the potential bird attraction and disorientation and thus collision mortality (EIS Appendix H).

During Phase 1 construction, offshore WTGs and ESPs added to the OCS would be lit in accordance with BOEM, USCG, and FAA requirements for both aviation safety (lights atop WTG nacelles) and vessel navigation (lights atop WTG and ESP foundations).

While the level of impacts would remain the same, BOEM is evaluating the following mitigation and monitoring measures to address impacts on commercial fisheries and for-hire recreational fishing, as described in detail in Table H-2 of EIS Appendix H. The Final EIS will list the mitigation and monitoring measures that BOEM would require as a condition of COP approval:

- Use of minimal lighting intensity necessary to permit safe operations and reduce potential attraction of birds to proposed Project vessels, WTGs, and ESPs.

Up to 62 WTGs and 1 or 2 ESPs associated with Phase 1 would all be lit with marine navigation and FAA hazard lighting. To comply with FAA requirements while minimizing lighting impacts, the applicant has committed to using ADLS for WTG nacelle-top lights. ADLS would only activate red flashing WTG nacelle-top lighting when aircraft enter a predefined airspace. Any new lights have some potential to attract birds and result in increased collision risk (Hüppop et al. 2006). However, red flashing aviation obstruction lights are commonly used at land-based wind facilities without any observed increase in avian mortality compared to unlit turbine towers (Kerlinger et al. 2010; Orr et al. 2013). Moreover, for Phase 1, ADLS was estimated to occur for less than 10 hours per year—less than 0.1 percent of annual nighttime hours (COP Appendix III-K; Epsilon 2022).

Marine navigation lighting would consist of multiple flashing yellow lights on each WTG and on the corners of each ESP. The impacts from lighting, if any, would be long term but **negligible** due to the use of red flashing lights and ADLS. Vessel lights during operations and decommissioning would be minimal and likely limited to vessels transiting to and from construction areas.

The expected **negligible** impact of Phase 1 would not noticeably increase the impacts of light beyond the impacts described under Alternative A.

**Noise:** The expected **negligible** impacts of aircraft, G&G survey, and pile-driving noise associated with Phase 1 would not increase the impacts of noise beyond the impacts described under Alternative A. Pile-driving noise could affect bird species during Phase 1 construction. These impacts would be short term (4 to 6 hours per day). Vessel and construction noise could disturb bird species, but birds would likely acclimate to the noise or move away, potentially resulting in a temporary loss of habitat (BOEM 2012). Because only temporary impacts, if any, are expected to occur, impacts would be **negligible** from construction of the offshore components.

**Presence of structures:** The various types of impacts on birds that could result from the presence of Phase 1 structures, such as fish aggregation and associated increase in foraging opportunities, as well as entanglement and fishing gear loss/damage, migration disturbances, and WTG strikes and displacement, are similar to those described for Alternative A. The impacts of Phase 1 from the presence of structures would be **minor** and may include **minor** beneficial impacts. Due to the anticipated use of ADLS, the restricted time period of exposure during migration, and the small number of migrants that could cross the SWDA annually, BOEM concludes that the impacts are **negligible** for Roseate Terns, Piping Plovers, and

Red Knots. The BA for the proposed Project (BOEM 2022b) provides a complete discussion of the potential collision risk to ESA-listed species as a result of operations of the proposed Project.

As described above and depicted for the SWDA on Figures G.2.4-3 and G.2.4-4, the locations of the OCS wind development areas were generally selected to minimize impacts on all resources, including birds. Within the Atlantic Flyway along the North American Atlantic Coast, much of the bird activity is concentrated along the coastline (Watts 2010). Waterbirds generally use a corridor between the coast and several miles out onto the OCS, while land birds tend to use a wider corridor extending from the coastline to tens of miles inland (Watts 2010). Phase 1 operations would result in impacts on some individuals of 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). The predicted activity of bird populations that have a higher sensitivity to collision, as defined by Robinson Willmott et al. (2013), is relatively low in the SWDA during all seasons (as modeled by the Marine-life Data and Analysis Team [Figure G.2.4-3]), suggesting that the likelihood of bird fatalities due to collision is low. Species in the higher collision sensitivity group that are unlikely to be present in the SWDA include, but are not limited to, the Black-legged Kittiwake (*Rissa tridactyla*), Double-crested Cormorant (*Phalacrocorax auritus*), Great Black-backed Gull (*Larus marinus*), Herring Gull (*Larus argentatus*), Laughing Gull (*Leucophaeus atricilla*), Northern Gannet, Parasitic Jaeger (*Stercorarius parasiticus*), and Pomarine Jaeger (*Stercorarius pomarinus*).

When turbines are present, many birds would avoid the turbine site altogether, especially the species that ranked “high” in vulnerability to displacement by offshore wind energy development (Robinson Willmott et al. 2013). In addition, many birds would likely adjust their flight paths to avoid wind turbines by flying above, below, or between them (Desholm and Kahlert 2005; Plonczkier and Simms 2012; Skov et al. 2018), and others may take extra precautions to avoid turbines when the turbines are moving (Vlietstra 2008; Johnston et al. 2014). Several species have very high avoidance rates; for example, the Northern Gannet, Black-legged Kittiwake, Herring Gull, and Great Black-backed Gull have measured avoidance rates of at least 99.6 percent (Skov et al. 2018). The applicant performed an exposure assessment to estimate the risk of various bird species encountering WTGs in the SWDA (COP Appendix III-C; Epsilon 2022). The species with the highest estimated risks were the Herring Gull, Great Black-backed Gull, Razorbill (*Alca torda*), Cory’s Shearwater (*Calonectris borealis*), and Black-legged Kittiwake. The risk for each species may change with the seasons, but at least one species would be at risk during any particular season. Averaged over the year, each species’ estimated risk of exposure was insignificant to low/unlikely, except for the Herring Gull and Great Black-backed Gull, for which the risk was medium/likely due to the potential attraction of gulls to vessels and offshore structures, upon which they may perch. While there is some possibility of marine birds perching on WTG structures, given the modeled low total abundance of marine birds within the SWDA (Figure G.2.4-2), increased collision risk would be limited to relatively few individuals of relatively few species. Based on the results of the exposure assessment (COP Appendix III-C; Epsilon 2022), only cormorants, jaegers, and gulls would exhibit a significant chance of encountering the SWDA. While cormorants’ typical low flight altitudes make them less vulnerable to collision, this is not the case with jaegers and gulls, although jaegers would only be expected to encounter operating WTGs during migration in the winter (COP Volume III, Section 6.2.2 and Appendix III-C; Epsilon 2022). In Massachusetts, jaegers and gulls are not listed as special concern species (MNHESP 2020).

During migration, many bird species, including songbirds, likely fly at heights well above the rotor swept zone (up to 1,047 feet above mean sea level for Phase 1) (COP Volume III, Section 6.2.2; Epsilon 2022). Species with low collision sensitivity include many passerines that only cross the Atlantic OCS briefly during migration and typically fly well above the rotor swept zone (Robinson Willmott et al. 2013). It is generally assumed that inclement weather and reduced visibility change migration altitudes (Ainley et al.

2015) and could potentially lead to large-scale mortality events. However, this has not been shown to be the case in studies of offshore wind facilities in Europe, with oversea migration completely, or nearly so, ceasing during inclement weather (Fox et al. 2006; Pettersson 2005; Hüppop et al. 2006) and with migrating birds avoiding flying through fog and low clouds (Panuccio et al. 2019). Further, many passerine species detected on the OCS during migration as part of BOEM's Acoustic/Thermographic Offshore Monitoring Project (Robinson Willmott and Forcey 2014) were documented in relatively low numbers. In addition, most observed activity (including Blackpoll warblers [*Setophaga striata*]) was during windspeeds less than 6.2 miles per hour—below the turbine cut in speed (Robinson Willmott and Forcey 2014), suggesting little risk to migrating passerines. Further, most carcasses of small migratory songbirds found at land-based wind energy facilities in the northeast were within 6.6 feet of the turbine towers, suggesting collisions with towers rather than moving turbine blades (Choi et al. 2020). Although it is possible that migrating passerines could collide into offshore structures, migrating passerines are also occasionally found dead on boats, presumably from exhaustion (Stabile et al. 2017).

Some marine bird species might avoid the SWDA during its operation, leading to an effective loss of habitat. For example, loons (Dierschke et al. 2016; Drewitt and Langston 2006; Lindeboom et al. 2011; Percival 2010; Petersen et al. 2006), grebes (Dierschke et al. 2016; Leopold et al. 2011, 2013), sea ducks (Drewitt and Langston 2006; Petersen et al. 2006), and Northern Gannets (Drewitt and Langston 2006; Lindeboom et al. 2011; Petersen et al. 2006) have been shown to typically avoid offshore wind developments. However, loons, sea ducks, grebes, and several gull species were not observed or observed in low densities in the SWDA during Massachusetts Clean Energy Center surveys, while Razorbills and Black-legged Kittiwakes were relatively common in winter (COP Appendix III-C, Table 4; Epsilon 2022). While the area of ocean occupied by Phase 1 would no longer provide foraging opportunities to species with high displacement sensitivity, suitable foraging habitat exists in the immediate vicinity of the proposed Project and throughout the region. Potentially suitable foraging habitats located to the northeast, north, and northwest of the proposed Project are located outside of the RI/MA Lease Areas and would remain available to these species following the anticipated development of the RI/MA Lease Areas. As depicted on Figure G.2.4-4, modeled use of the SWDA by bird species with high displacement sensitivity, including, but not limited to, the Common Loon (*Gavia immer*), Great Black-backed Gull, Northern Gannet, and Red-throated Loon is low. A complete list of species included in the higher displacement sensitivity group can be found in Robinson Willmott et al. (2013). Since the RI/MA Lease Areas avoid high-value sea duck habitat and are not likely to contain important foraging habitat for the other species susceptible to displacement, this loss of habitat would be insignificant (COP Volume III, Section 6.2.2; Epsilon 2022). Population-level long-term impacts resulting from habitat loss would be **negligible.**

While the level of impacts would remain the same, BOEM is evaluating the following mitigation and monitoring measures to address impacts on birds, as described in detail in Table H-2 of EIS Appendix H. The Final EIS will list the mitigation and monitoring measures that BOEM would require as a condition of COP approval:

- Install bird deterrent devices to minimize bird attraction to operating WTGs and ESPs, where and if appropriate.
- Require the applicant to coordinate with BOEM and the USFWS to finalize a post-construction bird monitoring plan prior to the commencement of operations. Such a plan would require the applicant, within the first year of operations, to install digital very high frequency telemetry automated receiving stations and acoustic monitoring devices to estimate the exposure of ESA species and other migratory birds to the operating wind facility. The monitoring plan could also require the applicant to install acoustic detectors for birds and provide periodic monitoring progress reports plus comprehensive annual reports, followed by a discussion of each year's results with BOEM and the USFWS, which would

include the potential need for reasonable revisions to the monitoring plan. All data generated as part of pre- and post-construction monitoring would be made available to the public through BOEM's website.

- Provide annual mortality reporting to BOEM and the USFWS.

**Traffic**: The expected **negligible** impacts of aircraft traffic associated with Phase 1 would not increase the impacts of this IPF beyond the impacts described under Alternative A.

***Impacts of Phase 2***

As described in this section, impact levels for Phase 2 are expected to be similar to those of Phase 1 (EIS Section 3.4.4.1) due to the use of similar construction and decommissioning techniques.

**Accidental releases:** Accidental releases associated with Phase 2 would be similar to those described for Phase 1 and would result in localized and temporary **negligible** impacts on birds.

**Cable emplacement and maintenance:** The impacts of Phase 2 from cable emplacement and maintenance would be similar to, but occur in a slightly larger area than, those described for Phase 1. Phase 2 construction would contribute up to 489 acres of seafloor disturbed by cable installation and up to 73 acres affected by dredging prior to cable installation resulting in turbidity impacts. Phase 2 cable emplacement would result in non-measurable **negligible** impacts, if any, on individuals or populations due to the localized and temporary nature of the potential impacts.

**Lighting:** Up to 88 WTGs and 2 or 3 ESPs associated with Phase 2 would be lit with navigational and FAA hazard lighting, as described under Phase 1, and would have similar **negligible** impacts that would not noticeably increase the impacts of light beyond the impacts described for Alternative A.

**Noise:** The expected **negligible** impacts of noise associated with Phase 2 would be similar to those described under Phase 1.

**Presence of structures:** The impacts on birds from the presence of Phase 2 structures would be similar to those described under Phase 1; they would be **minor** and may include **minor** beneficial impacts. As described in the BA (BOEM 2022b), Alternative B would have **negligible** impacts on Roseate Terns, Piping Plovers, and Red Knots (BOEM 2022b).

**Traffic**: The expected **negligible** impacts of aircraft traffic associated with Phase 2 would not increase the impacts of this IPF beyond the impacts described under Alternative A.

**Cumulative Impacts**

The cumulative impacts of Alternative B considered the impacts of Alternative B in combination with other ongoing and planned wind activities. Ongoing and planned non-offshore wind activities described in Table G.1-17 would contribute to impacts on birds through the primary IPF of the presence of structures. These impacts would primarily occur through potential mortality associated with collisions with operating WTGs on the OCS. The cumulative impacts from the presence of structures from ongoing and planned activities, including Alternative B, would range from **negligible** to **moderate** and may result in **moderate** beneficial impacts due to the large number of structures. Because Alternative B would comprise approximately 12.5 percent of the WTGs in the RI/MA Lease Areas, a majority of the impacts on birds due to the presence of structures would be associated with other future offshore wind development. Construction-related impacts from accidental releases, noise, and cable emplacement and maintenance associated with Alternative are likely to only minimally overlap (if at all) temporally or spatially with similar impacts from other future offshore wind activities.

The cumulative impacts of all IPFs from ongoing and planned activities, including Alternative B, would be **moderate,** with a **moderate** beneficial impact from the presence of structures until decommissioning

***Conclusions***

**Impacts of Alternative B.** Activities associated with construction, operations, and decommissioning of Alternative B would impact birds to varying degrees, depending on the location, timing, and species affected by an activity. Construction of offshore components is not likely to disturb or displace birds and would have a **negligible** impact on the resource. Operations of WTGs and ESPs could result in habitat loss and in collision-induced mortality, leading to **negligible** to **minor** impacts, with potential **minor** beneficial impacts. Offshore decommissioning would have impacts comparable to the construction stage.

**Cumulative Impacts of Alternative B.** The cumulative impacts on birds within the geographic analysis area resulting from ongoing and planned activities, including Alternative B, would range from **negligible** to **moderate** and could potentially include **moderate** beneficial impacts. Considering all the IPFs together, the impacts from ongoing and planned activities, including Alternative B, would result in **moderate** impacts on birds, primarily through ongoing climate change and the potential for direct mortality resulting from fatal interactions with operating WTGs associated planned activities. Alternative B would contribute to the overall impact rating primarily through the permanent impacts due to the presence of structures. Therefore, the overall impacts on birds would likely qualify as **moderate** because a notable and measurable impact is anticipated, but the resource would likely recover completely when the WTGs are removed and/or remedial or mitigating actions are taken.

**Impacts of Alternative C – Habitat Impact Minimization Alternative on Birds**

Alternatives C-1 and C-2 would not affect the number or placement of WTGs or ESPs for the proposed Project compared to Alternative B. While Alternatives C-1 and C-2 would alter the exact routes of inter-array, inter-link, and export cables installed for the proposed Project—and could, thus, affect the exact length of cable installed and area of ocean floor disturbed—these changes would not result in meaningfully different impacts on birds compared to Alternative B due to the homogenous nature of the habitat in the SWDA. Therefore, the impacts of Alternatives C-1 and C-2 on birds would the same as those for Alternative B.

## G.2.5 Terrestrial Habitats and Fauna

### G.2.5.1 Description of the Affected Environment

#### Geographic Analysis Area

This section discusses existing conditions in the geographic analysis area for terrestrial habitats and fauna, as described in Table D-1 in EIS Appendix D, Geographic Analysis Areas, and shown on Figure G.2.5-1. This includes all waters within the 3-nautical-mile (3.4-mile) seaward limit of Massachusetts' territorial sea that are within a 1-mile buffer of the OECC. It also includes all land areas that would be disturbed by the proposed Project, plus a 0.5-mile buffer. The faunal resources in the geographic analysis area would have small home ranges; therefore, impacts outside these home ranges would be unlikely to affect those resources. EIS Sections G.2.3 and G.2.4 discuss the potential impacts of offshore activities on bats and birds, respectively. EIS Section 3.5 discusses impacts on habitats along the shoreline and in nearshore waters. Table G.1-18 describes existing conditions and the impacts, based on the IPFs assessed, of ongoing and planned activities other than offshore wind.

#### Overview

The terrestrial portion of the proposed Project is located within the Long Island -Cape Cod Coastal Lowland Major Land Resource Area. Much of this area exhibits sandy soils, mixed hardwood-softwood forests, and scrublands subject to periodic fires (USDA 2006). Pine-oak forest is one of the most common habitat types on Cape Cod. This area also includes important habitats such as coastal wetlands, isolated freshwater wetlands, and a few small streams, although none of these habitats are present at locations where proposed Project work would take place. The geographic analysis area for terrestrial habitats and fauna is in a densely developed part of the state, and several wetlands, streams, rivers, and freshwater ponds occur within a 0.5-mile buffer around the OECR. EIS Section G.2.6 discusses wetlands and other waters of the U.S. Wetlands and riparian habitats in Massachusetts are gradually declining as a result of human development (Commonwealth of Massachusetts 2016). Much of the other habitat in the geographic analysis area is already fragmented and/or developed for human uses, including roads, utility ROW, and commercial and light industrial operations. Table G.2.5-1 lists some of the threatened and endangered plant species potentially occurring in the geographic analysis area. Because the geographic analysis area has been heavily developed for decades, habitat quality in the vicinity and, therefore, the potential suitability for use by native flora and fauna has been degraded. Past activities have been taken into consideration in defining the existing conditions of the resource (Table G.2.5-1).

COP Section 6.1.1.2 and Tables 1 and 3 of COP Appendix III-D (Epsilon 2022) list terrestrial faunal resources that are likely to occur near the geographic analysis area (Table G.2.5-2). The proposed Project would not encounter any known populations or habitats of terrestrial wildlife listed as threatened or endangered by the Commonwealth of Massachusetts or USFWS. Additionally, the proposed Project does not cross priority habitats or estimated habitats mapped by the Massachusetts Division of Fish and Wildlife Natural Heritage and Endangered Species Program (COP Volume III, Figure 6.1.2; Epsilon 2022).

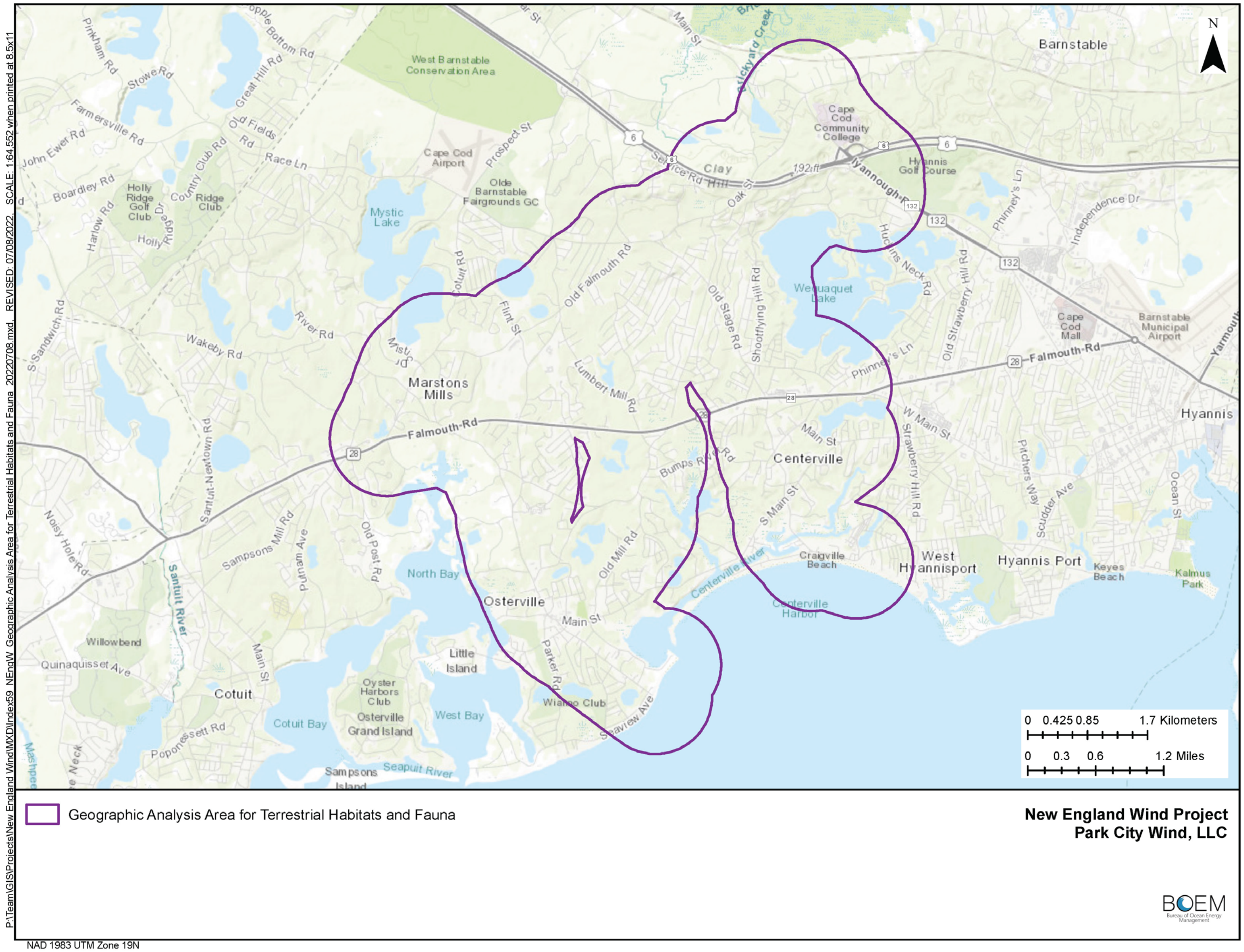



**Figure G.2.5-1: Geographic Analysis Area for Terrestrial Habitats and Fauna**

**Table G.2.5-1: Threatened and Endangered Plant Species Reported near the Proposed Project**

| Common Name | Scientific Name |
|---|---|
| Adder's tongue fern | *Ophioglossum pusillum* |
| Cranefly orchid | *Tipularia discolor* |
| Dwarf bulrush | *Typha minima* |
| Grass-leaved ladies'-tresses | *Spiranthes vernalis* |
| Heartleaf twayblade | *Neottia cordata* |
| Maryland meadow-beauty | *Rhexia mariana* |
| Mitchell's sedge | *Carex mitchelliana* |
| Papillose nut sedge | *Scleria pauciflora* |
| Purple needlegrass | *Nassella pulchra* |
| Sandplain gerardia | *Agalinis acuta* |
| Short-beaked beaksedge | *Rhynchospora nitens* |
| Slender marsh pink | *Sabatia campanulata* |
| Stiff yellow flax | *Linum medium* var. *texanum* |
| Swamp oats | *Sphenopholis pensylvanica* |
| Torrey's beaksedge | *Rhynchospora torreyana* |

Source: Commonwealth of Massachusetts 2022

The northern red-bellied cooter (*Pseudemys rubriventris*) is listed as a federal and state-endangered species. The closest northern red-bellied cooter population is more than 11 miles from the geographic analysis area; therefore, the species is unlikely to be present in the geographic analysis area (MNHESP 2016). Partially due to extensive management efforts by the Massachusetts Division of Fisheries and Wildlife and its partners, the northern red-bellied cooter population appears likely to be slowly growing (MNHESP 2016).

### Land Animals

Table G.2.5-2 lists terrestrial faunal resources that are likely to occur in the geographic analysis area. Prominent animal communities include residents of woodlands, amphibians and reptiles, and inland birds. (DeGraaf and Yamasaki 2001).

**Table G.2.5-2: Terrestrial Animal Species Reported near the Proposed Project**

| Taxonomic Group | Common Name | Scientific Name |
|---|---|---|
| Amphibian | Red-backed salamander | *Plethodon cinereus* |
| Amphibian | Red-spotted newt | *Notophthalmus viridescens* |
| Amphibian | American bullfrog | *Lithobates catesbeianus* |
| Amphibian | Green frog | *Lithobates clamitans* |
| Amphibian | Northern leopard frog | *Lithobates pipiens* |
| Amphibian | Wood frog | *Lithobates sylvaticus* |
| Amphibian | American toad | *Anaxyrus americanus* |
| Amphibian | Fowler’s toad | *Anaxyrus fowleri* |
| Amphibian | Gray tree frog | *Hyla versicolor* |
| Amphibian | Northern spring peeper | *Pseudacris crucifer* |
| Bird | Turkey vulture | *Cathartes aura* |
| Bird | Cooper’s hawk | *Accipiter cooperii* |
| Bird | Sharp-shinned hawk | *Accipiter structus* |
| Bird | Northern saw-whet owl | *Aegolius acadicus* |
| Bird | Red-tailed hawk | *Buteo jamaicensis* |
| Bird | Wild turkey | *Meleagris gallopavo* |
| Bird | Mourning dove | *Zeneida macroura* |
| Bird | Whip-poor-will | *Caprimulgus vociferous* |

| **Taxonomic Group** | **Common Name** | **Scientific Name** |
|---|---|---|
| Bird | Downy woodpecker | *Picoides pubescens* |
| Bird | Eastern phoebe | *Sayornis phoebe* |
| Bird | Blue jay | *Cyanocitta cristata* |
| Bird | American crow | *Corvus brachyrhynchos* |
| Bird | Fish crow | *Corvus ossifragus* |
| Bird | Tufted titmouse | *Beeoloptus bicolor* |
| Bird | White-breasted nuthatch | *Sitta caroliniensis* |
| Bird | Hermit thrush | *Catharus guttatus* |
| Bird | Yellow-rumped warbler | *Setophaga coronate* |
| Bird | Ovenbird | *Seiurus aurcopillus* |
| Bird | Eastern towhee | *Pipilo erythro-phtalmus* |
| Bird | Chipping sparrow | *Spizella passerine* |
| Insect | Blue dasher | *Pachydiplax longipennis* |
| Insect | Calico pennant | *Celithermis elisa* |
| Insect | Common whitetail | *Libellula lydia* |
| Insect | Eastern pondhawk | *Erythemis simplicicollis* |
| Insect | Golden-winged skimmer | *Libellula auripennis* |
| Insect | Slaty skimmer | *Libellula incesta* |
| Insect | White corporal | *Libellula exusta* |
| Insect | Eastern comma | *Polygonia comma* |
| Insect | Great spangled fritillary | *Speyeria cybele* |
| Insect | Mourning cloak | *Nymphalis antiopa* |
| Insect | Red admiral | *Vanessa atalanta* |
| Insect | Red-spotted purple | *Limenitis artemis astyanax* |
| Insect | Striped hairstreak | *Satyrium liparops* |
| Insect | True skipper sp. | *Hesperia* sp. |
| Insect | Polyphemus moth | *Antheraea polyphemus* |
| Insect | Six-spotted green tiger beetle | *Cicindela sexguttata* |
| Mammal | Beaver | *Castor canadensis* |
| Mammal | Coyote | *Canis latrans* |
| Mammal | Gray fox | *Urocyon cinereoargenteus* |
| Mammal | New England cottontail | *Sylvilagus transitionalis* |
| Mammal | Muskrat | *Ondatra zibethicus* |
| Mammal | Red fox | *Vulpes vulpes* |
| Mammal | Raccoon | *Procyon lotor* |
| Mammal | Striped skunk | *Mephitis mephitis* |
| Mammal | Fisher | *Martes pennant* |
| Mammal | White-tailed deer | *Odocoileus virginianus* |
| Mammal | Red squirrel | *Tamiasciurus hudsonicus* |
| Mammal | Virginia opossum | *Didelphis virginiana* |
| Mammal | Woodchuck | *Marmota monax* |
| Reptile | Eastern hognose snake | *Heterodon platirhinos* |
| Reptile | Eastern ribbon snake | *Thamnophis sauritus* |
| Reptile | Milk snake | *Lampropeltis triangulum* |
| Reptile | Painted turtle | *Chrysemys picta* |
| Reptile | Diamondback terrapin | *Malaclemys terrapin* |
| Reptile | Snapping turtle | *Chelydra serpentine* |
| Reptile | Common musk turtle | *Sternotherus odoratus* |
| Reptile | Eastern hognose snake | *Heterodon platirhinos* |
| Reptile | Eastern ribbon snake | *Thamnophis sauritus* |
| Reptile | Milk snake | *Lampropeltis triangulum* |

Source: COP Volume III, Section 6.1; Epsilon 2022

### Trends

The current state of local terrestrial habitats and fauna resources is generally stable, although land disturbance from ongoing activities periodically affects terrestrial habitats and fauna in the geographic analysis area. Land disturbance from onshore construction periodically causes temporary and permanent habitat loss, temporary displacement, collision, injury, and mortality, resulting in minimal, short-term impacts on terrestrial habitats and fauna. Ground-disturbing activities contribute to elevated levels of erosion and sedimentation but not to a degree that affects terrestrial habitats and fauna. Periodic clearing of shrubs and tree saplings along existing utility ROWs causes disturbance and temporary displacement of mobile species and may cause injury or mortality of less-mobile species, although this is not known to be a concern at a population level. Periodically, undeveloped parcels are cleared and developed for human uses, permanently changing the condition of those parcels as habitats for terrestrial fauna.

Maintenance of existing roads and public utilities will continue indefinitely. Outside of currently protected areas, the conversion of natural areas to developed residential, commercial, and industrial uses is also likely to continue. 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 (Friggens et al. 2018). Climate change, sea level rise, and other ongoing activities and planned activities could also affect the land-water interface. Because the offshore components of the proposed Project have no potential impacts on terrestrial fauna other than certain flying species, this section does not discuss offshore activities.

## G.2.5.2 Environmental Consequences

Definitions of impact levels for terrestrial habitats and fauna are described in Table G.2.5-3. There are no beneficial impacts on terrestrial habitats and fauna.

**Table G.2.5-3: Impact Level Definitions for Terrestrial Habitats and Fauna**

| Impact Level | Impact Type | Definition |
|---|---|---|
| Negligible | Adverse | Impacts on species or habitat would be so small as to be unmeasurable. |
| Minor | Adverse | Most impacts on species would be avoided; if impacts occur, they may result in the loss of a few individuals. Impacts on sensitive habitats would be avoided; impacts that do occur are temporary or short term in nature. |
| Moderate | Adverse | Impacts on species would be unavoidable but would not result in population-level impacts. Impacts on habitat may be short term, long term, or permanent and may include impacts on sensitive habitats but would not result in population-level impacts on species that rely on them. |
| Major | Adverse | Impacts would affect the viability of the population and would not be fully recoverable. Impacts on habitats would result in population-level impacts on species that rely on them. |

### Impacts of Alternative A – No Action Alternative on Terrestrial Habitats and Fauna

When analyzing the impacts of Alternative A on terrestrial habitats and fauna, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the existing conditions for terrestrial habitats and fauna (Table G.1-18). The cumulative impacts of Alternative A considered the impacts of Alternative A in combination with other planned non-offshore wind and offshore wind activities, as described in EIS Appendix E, Planned Activities Scenario.

Under Alternative A, existing conditions for terrestrial habitats and fauna and wetlands described in Section G.2.6.1 would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore wind activities within the geographic analysis area that contribute to impacts on terrestrial habitats and fauna include land disturbance—as described in the Trends discussion in Section G.2.5.1. Terrestrial habitats and fauna would continue to follow current regional trends and respond to current and future environmental and societal activities. Considering current conditions and the modest pace of development in the geographic analysis area, terrestrial fauna is expected to remain generally stable under Alternative A.

Ongoing offshore wind activities within the geographic analysis area that contribute to impacts on terrestrial habitats and fauna include construction of the landfall sites, onshore cables, and substations for the Vineyard Wind 1 Project in Barnstable County. The extent of impacts on terrestrial habitats and fauna would depend on landfall locations, OECR routing, and onshore substation locations. To the degree that planned offshore wind activities involve landfall locations and cable routes in Bristol County, these projects could contribute to the impacts of the SCV. Ongoing and planned activities (including offshore wind) would affect terrestrial habitats and fauna through the primary IPFs described below.

***Cumulative Impacts***

The cumulative impact analysis for Alternative A considers the impacts of Alternative A in combination with other planned non-offshore wind activities and planned offshore wind activities (other than Alternative B). To the degree that any future offshore wind activities other than the proposed Project occur in the geographic analysis area for terrestrial habitats and fauna, these projects could cause impacts such as displacement, mortality, and habitat loss, primarily through land disturbance, although the majority of this IPF would be attributable to ongoing activities. Future offshore wind development activities would affect terrestrial habitats and fauna through the following primary IPFs.

**Climate change:** Climate change would contribute to impacts on terrestrial habitats and fauna, primarily due to existing global and regional climate trends. Although sources of GHG emissions contributing to regional and global climate change mostly occur outside the geographic analysis area for terrestrial habitats and fauna, terrestrial fauna may be affected by warming, sea level rise, and altered habitat/ecology. Climate change is altering the seasonal timing and patterns of species distributions and ecological relationships, likely causing permanent impacts of unknown intensity (Friggens et al. 2018). EIS Section G.2.1, Air Quality, discusses the expected contribution of offshore wind activities to climate change.

**Land disturbance:** Impacts due to onshore land use changes from ongoing and planned activities are expected to include a gradually increasing amount of habitat alteration and habitat loss, likely changing the composition of local faunal assemblages and possibly reducing the local abundance of terrestrial habitats and fauna. Onshore construction associated with future offshore wind projects could result in minimal temporary impacts on terrestrial habitats and fauna during construction, including disturbance, displacement, and potential injury and/or mortality of individuals. Collisions between animals and vehicles or construction equipment could cause mortality. This would be rare because most individuals would likely avoid the noise and vibration of the construction areas, although animals with limited mobility, especially reptiles and amphibians (COP Volume III, Table 6.1-1; Epsilon 2022), may be vulnerable to this type of impact. However, there would be little to no impact on these populations in light of the expected limited construction footprint and use of existing utility ROWs and previously disturbed areas.

**Noise**: Construction noise and vibration could lead to the disturbance and temporary displacement of mobile species. Displaced individuals would likely return to the affected areas once the noise and vibration has ended (COP Volume III, Section 6.1.2.1.2; Epsilon 2022). It is possible that individuals could experience repeated stress events if they returned to a site during pauses in construction activity, only for renewed construction activity to drive them away again later. These impacts would be limited and temporary. Normal operations of project substations associated with future offshore wind development would generate continuous noise, but there would be little associated impact due to the presence of existing commercial and industrial noises in the region. Terrestrial fauna may habituate to noise so that it has little to no impact on their behavior or biology (Kight and Swaddle 2011). Management of the existing utility ROW would continue to involve periodic removal of tree saplings. The presence of onshore construction equipment could temporarily prevent or deter animals from approaching or crossing the site of a given non-routine event. Impacts on terrestrial habitats and fauna would be temporary, lasting only as long as repair or remediation activities necessary to address these non-routine events. Considering that the geographic analysis area for terrestrial habitats and fauna is largely developed and contains many roads, terrestrial habitats and fauna in this area are likely to be already subject to anthropogenic noise.

***Conclusions***

**Impacts of Alternative A.** Impacts on terrestrial habitats and fauna from ongoing activities, especially climate change and land disturbance, would be **minor** to **moderate**. In addition to ongoing activities, planned activities other than offshore wind, primarily increasing onshore construction, may also contribute to impacts on terrestrial habitats and fauna.

**Cumulative Impacts of Alternative A.** No future construction projects were identified within the geographic analysis area for terrestrial habitats and fauna; the impacts of planned activities other than offshore wind would be **negligible** to **minor**. Ongoing and planned activities would result in **minor** to **moderate** impacts on terrestrial habitats and fauna, primarily driven by climate change and land disturbance.

To the degree that any future offshore wind activities other than the proposed Project occur in the geographic analysis area for terrestrial habitats and fauna, the impacts of those future offshore wind activities on terrestrial habitats and fauna would be similar to those of Alternative B. Considering the IPFs collectively, ongoing and planned activities in the geographic analysis area would result in **moderate** cumulative impacts, primarily through climate change and land disturbance. Future offshore wind activities would contribute to the impacts through land disturbance, although the majority of this IPF would be attributable to ongoing activities.

**Relevant Design Parameters and Potential Variances in Impacts**

The following proposed Project design parameters (EIS Appendix C, Project Design Envelope and Maximum-Case Scenario) would influence the magnitude of the impacts on terrestrial habitats and fauna:

- The routing variants within the OECR;
- The time of year during which construction occurs; and
- Changes to the size, configuration, and location of onshore substations.

This assessment analyzes the maximum-case scenario; any potential variances in construction activities or in the parameters listed above would result in similar or lesser impacts than described below. For instance, summer and fall months (May through October) constitute the most active season for terrestrial habitats and fauna in this area, especially for reptiles and amphibians. Therefore, construction during months in which terrestrial habitats and fauna are not present, not breeding, or less active would have lesser impacts on terrestrial fauna than construction during more active times.

**Impacts of Alternative B – Proposed Action on Terrestrial Habitats and Fauna**

This section identifies potential impacts of Alternative B on terrestrial habitats and fauna.

***Impacts of Phase 1***

Phase 1 would affect terrestrial habitats and fauna through the following primary IPFs during construction, operations, and decommissioning

**Climate change**: Climate change would contribute to impacts on terrestrial habitats and fauna, primarily through existing global and regional climate trends. As discussed in EIS Section G.2.1, Phase 1 construction would have **negligible** impacts on climate change, and this IPF would, therefore, have **negligible** impacts on terrestrial habitats and fauna. Phase 1 would have no measurable influence on this IPF.

**Land disturbance**: Onshore construction of the proposed Project could contribute to elevated levels of erosion and sedimentation due to periodic ground-disturbing activities but usually not to a degree that affects terrestrial habitats and fauna, assuming that industry standard BMPs are implemented.

Phase 1 construction activities would temporarily disturb up to 15.5 acres in the OECR. The estimation of temporary disturbance is based upon the maximum buildout scenario of a 6.5-mile-long, 21-foot-wide OECR (COP Volume I, Section 3.2.2; Epsilon 2022). Onshore construction of the proposed Project would permanently disturb up to 10.5 acres in a maximum buildout scenario, accounting for the clearing and grading of the onshore substation site, access road, and potential onshore substation equipment site. Onshore construction associated with the future offshore wind projects could result in minimal temporary impacts on terrestrial fauna during construction, including disturbance, displacement, and potential injury and/or mortality of individuals. Collisions between animals and vehicles or construction equipment could cause mortality. This would be rare, as most individuals would likely avoid the construction areas. However, animals with limited mobility, especially reptiles and amphibians (COP Appendix III-D, Table 1; Epsilon 2022), may be vulnerable to this type of impact. In light of the limited construction footprint, there would be little to no impact on populations.

The proposed Project would not involve permanent habitat alteration in the OECR, but construction of the substation site would permanently convert up to approximately 3.0 acres of pine-oak forested habitat at the Phase 1 onshore substation site at 8 Shootflying Hill Road, up to 1.0 acre for a potential substation site access road at 6 Shootflying Hill Road, and up to 2.8 acres at Parcel #214-001. These changes would have a minimal impact on terrestrial habitats and fauna because this type of forest habitat is common across Cape Cod and is available as a high quality, contiguous block in the Barnstable State Forest, which lies as near as 0.25 mile from the proposed substation area. The land disturbance involved in Phase 1 would, therefore, result in **minor** impacts due to habitat alteration, mortality, and temporary displacement of terrestrial habitats and fauna from the proposed substation site.

**Noise**: Construction noise and vibration could lead to the disturbance and temporary displacement of mobile species. Noise and human activity from trenching would be temporary and localized to the OECR and the substation site(s). Displaced wildlife could use adjacent habitat and would repopulate these areas once construction ceases. Displaced individuals would likely return to the affected areas once the noise and vibration have ended (COP Volume III, Section 6.1.2.1.2; Epsilon 2022). It is possible that individuals could experience repeated stress events if they returned to the site at night, when construction has paused, only for construction to drive them away again in the morning. These impacts would be limited and temporary in nature and, therefore, **minor**.

BOEM would not expect normal operations activities to involve further habitat alteration or otherwise impact terrestrial fauna. Normal operations of the Phase 1 substation would generate continuous noise, but there would be **negligible** impacts. Phase 1 onshore facilities would be monitored and controlled remotely, and the proposed Project would typically accomplish maintenance and any necessary repairs through manholes at the splice vaults for the transmission line, within the fenced area of the substation site, or well within the existing public utility ROW (COP Volume III, Section 6.1.2.2; Epsilon 2022)., and these impacts would be **negligible**.

Many of the Phase 1 onshore components could be retired in place or retained for future use, although removal of onshore cables via existing manholes may occur if required (COP Volume I, Section 3.3.3; Epsilon 2022). The splice vaults, duct bank, and onshore substations would likely remain as infrastructure that would be available for future offshore wind or other projects. To the extent that decommissioning of the onshore facilities occurs, the impacts from decommissioning would be similar to, but less than, the impacts from construction (short term and **minor**).

***Impacts of Phase 2***

The impacts of Phase 2 construction, operations, and decommissioning on terrestrial habitats and fauna from the IPFs for climate change and noise would be the same as described for Phase 1. Phase 2 would affect terrestrial habitats and fauna through the IPF for land disturbance as described below.

**Land disturbance**: Phase 2 construction activities would temporarily disturb up to 26.9 acres in the OECR. The estimation of temporary disturbance is based on the maximum buildout scenario of a 10.6-mile-long, 21-foot-wide OECR (COP Volume I, Section 4.2.2; Epsilon 2022). Onshore construction of the proposed Project would permanently disturb up to 54 acres in a maximum buildout scenario, accounting for the clearing and grading of the onshore substation site(s) and access roads. There would be little to no impact on terrestrial habitats and fauna because of the limited construction footprint and use of existing utility ROWs and previously disturbed areas.

Phase 2 would not involve permanent habitat alteration in the OECR, but construction of the onshore substation site would permanently convert up to approximately 19 acres. Additionally, the maximum area of tree clearing anticipated to be required to accommodate access during Phase 2 onshore substation construction is approximately 8 acres. These changes would have a minimal impact on terrestrial habitats and be unlikely to have population-level impacts on terrestrial fauna.

The applicant has not yet defined the SCV OECC route within state waters in Buzzards Bay or the SCV OECR in Bristol County, Massachusetts. The land disturbance impacts of the finalized SCV OECC and OECR route (including a 0.5-mile buffer) will be evaluated in a supplemental NEPA analysis.

The land disturbance required for Phase 2 would result in **minor** habitat alteration, mortality, and temporary displacement of terrestrial habitats and fauna from the proposed substation site. The potential impacts of Phase 2 operations on terrestrial habitats and fauna would be similar to those of Phase 1 and, therefore, **negligible**. The potential impacts of decommissioning would be similar to those of Phase 1 and, therefore, short term and **minor**.

***Cumulative Impacts***

If a future project were to cross the geographic analysis area or be collocated (partly or completely) within the geographic analysis area, the impacts of those future projects on terrestrial habitats and fauna would be of the same type as those of Phase 1; the degree of impacts may increase, depending on the exact location and timing of planned activities. For example, repeated construction in a single ROW corridor would have less impact (e.g., displacement, mortality, habitat loss) on terrestrial habitats and fauna than construction in an equivalent area of undisturbed habitat. The only ongoing or planned project that would overlap with the proposed Project is construction of the Vineyard Wind 1 OECR and onshore substation. Cumulative impacts on terrestrial habitats and fauna would therefore be **minor** to **moderate**.

***Conclusions***

**Impacts of Alternative B.** The activities associated with Alternative B could affect terrestrial habitats and fauna through temporary disturbance, injury, or mortality, and permanent conversion of a minimal proportion of the overall habitat available regionally. Construction of Alternative B would have **minor** impacts on terrestrial habitats and fauna.

**Cumulative Impacts of Alternative B.** In the context of ongoing and planned activities in the geographic analysis area, impacts resulting from individual IPFs would range from **minor** to **moderate**. Considering all the IPFs together, the combined impacts on terrestrial habitats and fauna from ongoing and planned activities, including Alternative B, would be **moderate,** primarily through climate change and land disturbance.

**Impacts of Alternative C – Habitat Impact Minimization Alternative on Terrestrial Habitats and Fauna**

Under Alternatives C-1 and C-2, onshore activities and impacts would be identical to those for Alternative B.

### G.2.6 Wetlands and Other Waters of the United States

#### G.2.6.1 Description of the Affected Environment

This section discusses the existing conditions of wetlands and other waters of the U.S. in the geographic analysis area, as described in Table D-1 in EIS Appendix D, Geographical Analysis Areas, and shown on Figure G.2.6-1. The geographic analysis area includes onshore development areas within the watersheds for Cape Cod (hydrologic unit code [HUC]-0109000202), Martha's Vineyard and the Elizabeth Islands (HUC-0109000206), Nantucket Island (HUC-0109000207), and open ocean areas within USACE's jurisdiction. Under Section 404 of the Clean Water Act (CWA), the USACE regulates the discharge of dredged or fill material into waters of the U.S. The limits of USACE jurisdiction in non-tidal waters (33 CFR § 328.4) are as follows:

- In the absence of adjacent wetlands, the jurisdiction extends to the ordinary high water mark; or when adjacent wetlands are present, the jurisdiction extends beyond the ordinary high water mark to the limit of the adjacent wetlands.
- When the water of the U.S. consists only of wetlands, the jurisdiction extends to the limit of the wetland.

In addition, under Section 10 of the Rivers and Harbors Act of 1899, the USACE regulates construction of any structure and work that are located in or that affect "navigable waters of the U.S." from the mean high water line to the seaward limit of the OCS (43 USC 1333[e] and 33 CFR 320.2).

These marine environments within the geographic analysis area are included in the affected environment and are shown on Figure G.2.6-1 as a reflection of the full extent of USACE jurisdiction. However, to avoid duplication of analysis this section focuses only on non-tidal waters and wetlands. Impacts on tidal waters and wetlands, including all USACE jurisdictional waters and wetlands from the high tide line to the 3-nautical-mile (3.5-mile) limit of territorial seas are discussed in EIS Section 3.5, Coastal Habitats and Fauna. Existing conditions and impacts for open waters from the limits of territorial seas to the edge of the U.S. Exclusive Economic Zone are discussed in EIS Section G.2.2, Water Quality, as well as other resource sections related to open water environments.

Non-tidal wetlands are important features in the landscape that provide numerous beneficial services or functions. Some of these include protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters, providing aesthetic value, ensuring biological productivity, filtering pollutant loads, and maintaining surface water flow during dry periods. The land within the geographic analysis area for the proposed Project is located in Barnstable County, Massachusetts. Of the approximately 48,000 acres of wetlands in Massachusetts, approximately 1,250 acres (2.6 percent) were changed to other land cover types between 1991 and 2005 (MassDEP 2022). The geographic analysis area is in a densely developed part of the state with several nearby wetlands.

Within the Cape Cod watershed, two subwatersheds overlap the proposed Project: Hyannis Harbor-Frontal Nantucket Sound Subwatershed (HUC-010900020203) and Barnstable Harbor-Cape Cod Bay Subwatershed (HUC-010900020201) (USGS 2020). A variety of freshwater wetlands are located within or near the onshore portions of the proposed Project, including vernal pools, cranberry bogs, and wooded marshes. Non-tidal portions of the Centerville River, Herring River, Long Pond, Wequaquet Lake, Shallow Pond, and Bearse Pond are also located within or near the onshore portions of the proposed Project (COP Volume III, Section 6.1.1; Epsilon 2022). Because the geographic analysis area has been heavily developed for decades, habitat quality in the vicinity, including wetlands, has been degraded (MassDEP 2019). About 91,900 acres of non-tidal wetlands and non-tidal waters are within the geographic analysis area.

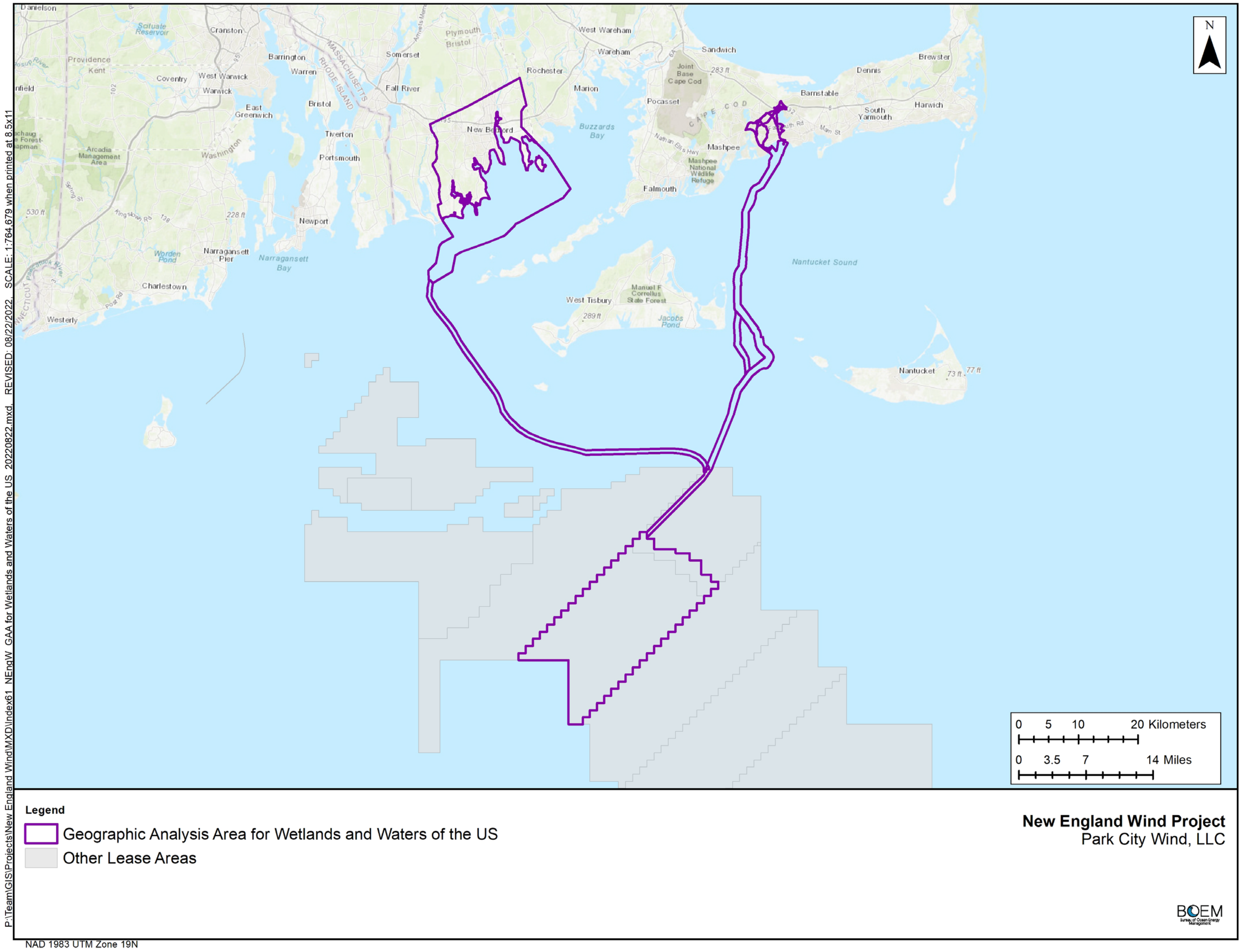



**Figure G.2.6-1: Geographic Analysis Area for Wetlands and Other Waters of the United States**

### G.2.6.2 Environmental Consequences

Definitions of potential impact levels are provided in Table G.2.6-1. There are no beneficial impacts on tidal waters and wetlands. USACE define wetland impacts differently than BOEM due to requirements under CWA Section 404 (as summarized below).

**Table G.2.6-1: Impact Level Definitions for Wetlands and Other Waters of the United States**

| Impact Level | Definition |
|---|---|
| Negligible | Impacts on wetlands would be so small as to be unmeasurable, and impacts would not result in a detectable change in wetland quality and function. |
| Minor | Impacts on wetlands would be minimized and would be relatively small and localized. If impacts occur, wetlands would completely recover. |
| Moderate | Impacts on wetlands would be minimized; however, permanent impacts would be unavoidable. Compensatory mitigation required to offset impacts on wetland functions and values would have a high probability of success. |
| Major | Impacts on wetlands would be minimized; however, permanent impacts would be regionally detectable. Extensive compensatory mitigation required to offset impacts on wetland functions and values would have a marginal or unknown probability of success. |

#### Impacts of Alternative A – No Action Alternative on Wetlands and Other Waters of the United States

When analyzing the impacts of Alternative A on tidal waters and wetlands, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for tidal waters and wetlands (Table G.1-19). The cumulative impacts of Alternative A considered the impacts of Alternative A in combination with other planned non-offshore wind and offshore wind activities, as described in EIS Appendix E, Planned Activities Scenario.

Under Alternative A, baseline conditions for tidal waters and wetlands described in Section G.2.6.1 would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore wind activities within the geographic analysis area that contribute to impacts tidal waters and wetlands include human activities such as roads; utility ROW; an airport; residential, commercial, and light industrial activities; and other future offshore wind activities. Future non-offshore wind actions include residential, commercial, and industrial development; dredging and port improvement projects; and proposed onshore WTGs and communications towers. The conversion of wetlands in Massachusetts (Section G.2.6.1) has led the Massachusetts Department of Environmental Protection (MassDEP) to implement the Wetlands Loss Project to prevent further alterations and loss of wetlands. This program compiles aerial photographs across the state to enable comparisons of wetland loss over time and better focus the state's enforcement and restoration activities (MassDEP 2022). Accumulation of sediments from upland erosion may also decrease wetland volume naturally. Discharges from septic tank systems onshore can create potential nutrient loading and other non-point source pollution in nearby non-tidal waters and wetlands.

Ongoing offshore wind activities within the geographic analysis area that contribute to impacts on tidal waters and wetlands include construction of the landfall sites, onshore cables, and substations for the Vineyard Wind 1 Project in Barnstable County. The extent of impacts on non-tidal waters and wetlands would depend on landfall locations, OECR routing, and onshore substation locations. In Massachusetts, any proposed work must meet certain standards in the Wetlands Protection Act (Massachusetts General Laws Chapter 131, Section 40), which is administered by each local community's conservation commission to prevent long-term impacts on wetlands. To the degree that planned offshore wind activities involve landfall locations and cable routes in Bristol County, these projects could contribute to the impacts of the SCV. Ongoing and planned activities (including offshore wind) would affect tidal waters and wetlands through the primary IPFs described below.

### *Cumulative Impacts*

The cumulative impact analysis for Alternative A considers the impacts of Alternative A in combination with other planned non-offshore wind activities and planned offshore wind activities (other than Alternative B). Tidal waters and wetlands could potentially be affected by future offshore wind activities through the following primary IPFs.

**Accidental releases**: Accidental releases from onshore components (i.e., transformers and construction equipment) could affect nearby and adjacent non-tidal waters or wetlands. During onshore construction of offshore wind projects in the geographic analysis area, oil leaks and accidental spills from construction equipment are potential sources of contamination for non-tidal waters and wetlands. Onshore substations would house transformers and other electrical components that may leak hazardous fluids, such as dielectric fluid. While many wetlands act to filter out contaminants, any significant increase in contaminant loading could exceed the capacity of a wetland to perform its normal water quality functions. Although degradation of water quality in non-tidal waters and wetlands could occur during construction, decommissioning, and, to a lesser extent, operations, due to the small volumes of spilled material anticipated, these impacts would all be short term until the source of the contamination is removed. Compliance with applicable state and federal regulations related to oil spills and waste handling would minimize potential impacts from accidental releases. These include the Resource Conservation and Recovery Act (42 USC § 6901 et seq.), U.S. Department of Transportation Hazardous Material regulations (49 CFR Parts 100–185), and implementation of a spill prevention, control, and countermeasure plan (EIS Appendix H, Mitigation and Monitoring). Impacts from accidental releases on wetlands would be minimal and localized, and compliance with state and federal regulations would avoid or minimize potential impacts on wetland quality or functions. The potential for accidental releases would be higher during construction and decommissioning of onshore components and less during operations. Impacts of releases on offshore waters are discussed in EIS Section G.2.2, Water Quality.

**Climate change:** Although sources of GHG emissions contributing to regional and global climate change mostly occur outside the geographic analysis area, climate change would contribute to impacts on non-tidal waters and wetlands in the geographic analysis area resulting from changes in temperature and changes in the frequency of, and total, precipitation. These changes can alter hydrology and the types of habitats and biodiversity that wetlands and other waters of the U.S. support. EIS Section G.2.1, Air Quality, discusses the expected contribution of offshore wind activities to climate change.

**Land disturbance**: Construction of onshore components (e.g., onshore export cables, substations) in the geographic analysis area for the proposed Project could include clearing, excavating, trenching, filling, and grading, which could result in the loss or alteration of wetlands, causing impacts on wetland habitat, water quality, and flood and storage capacity functions. Fill material permanently placed in wetlands during construction would result in the permanent loss of wetlands, including any habitat, flood and storage capacity, and water quality functions that the wetlands may provide. If a wetland were partially filled and fragmented or if wetland vegetation were trimmed, cleared, or converted to a different vegetation type (e.g., forest to herbaceous), habitat would be altered and degraded (affecting wildlife use), and water quality and flood and storage capacity functions would be reduced by changing natural hydrologic flows and reducing the wetland's ability to impede and retain stormwater and floodwater. On a watershed level, any permanent wetland loss or alteration could reduce the capacity of regional wetlands to provide wetland functions. Short-term wetland impacts may occur from construction activity that crosses or is adjacent to wetlands, such as rutting, compaction, and mixing of topsoil and subsoil. Where construction leads to unvegetated or otherwise unstable soils, precipitation events could erode soils, resulting in sedimentation that could affect water quality in nearby wetlands, as well as alter wetland functions if sediment loads are high (e.g., habitat impacts from burying vegetation). The extent of wetland impacts would depend on specific construction activities and their proximity to wetlands. These impacts would occur primarily during construction and decommissioning; impacts during operations would only occur if new ground disturbance were required, such as to repair a buried component. Onshore project components from other offshore wind projects would likely be sited in disturbed areas (e.g., along existing roadways), which would avoid and minimize wetland impacts. In addition, the offshore wind projects would be designed to avoid wetlands to the extent feasible. Because Vineyard Wind 1 is the only project whose onshore construction would overlap the geographic analysis area, and because that project, like all other offshore wind projects, would be required to comply with local, state, and federal regulations related to the protection of wetlands by avoiding or minimizing impacts, land disturbance from onshore construction of future offshore wind projects in the geographic analysis area would have only temporary impacts on nearby non-tidal waters and wetlands.

***Conclusions***

**Impacts of Alternative A.** Under Alternative A, non-tidal waters and wetlands would continue to follow current regional trends and respond to current and future environmental and societal activities. While the proposed Project would not be built under Alternative A, ongoing activities would have continuing impacts primarily through accidental releases and land disturbance. Considering all the IPFs together, ongoing and planned activities in the geographic analysis area would have **minor** impacts on non-tidal waters and wetlands, predominantly due to accidental releases and climate change.

**Cumulative Impacts of Alternative A.** In addition to ongoing activities, planned activities may also contribute to impacts on non-tidal waters and wetlands, primarily through accidental releases and land disturbance. Considering all the IPFs together, Alternative A combined with ongoing and planned activities would result in **minor** cumulative impacts on non-tidal waters and wetlands.

**Relevant Design Parameters and Potential Variances in Impacts**

The following primary proposed Project design parameters (EIS Appendix C, Project Design Envelope and Maximum-Case Scenarios) would influence the magnitude of the impacts on non-tidal waters and wetlands:

- While most Phase 1 and Phase 2 OECR alignments would primarily follow public roadway layouts, portions of the routes may also be located within utility ROWs and could cross non-tidal waters and wetlands;
- Different construction techniques, including HDD, microtunneling, direct pipe, or a new utility bridge, could have different impacts on lands adjacent to or near non-tidal waters and wetlands. Trenchless methods would be used (at minimum) at the onshore cable landing sites; and
- Changes to the number or design capacity of offshore wind turbines would not alter the maximum potential impacts on non-tidal waters and wetlands. because the number of turbines would not affect onshore infrastructure.

**Impacts of Alternative B – Proposed Action on Wetlands and Other Waters of the United States**

This section identifies potential impacts of Alternative B on non-tidal waters and wetlands.

***Impacts of Phase 1***

Phase 1 would affect non-tidal waters and wetlands through the following primary IPFs during construction, operations, and decommissioning.

**Accidental releases**: Onshore construction activities would require heavy equipment use, and potential spills of petroleum products could result from an inadvertent release from machinery or refueling activities. The proposed Project would perform the majority of fueling and equipment maintenance activities at service stations or a contractor's yard (COP Volume III, Table 4.2-1; Epsilon 2022). Less-mobile equipment, such as excavators or paving equipment, would be refueled on site but not within 100 feet of wetlands, waterbodies, or known private or community potable wells (COP Volume III, Section 5.2.2; Epsilon 2022). Additionally, the applicant would prepare a spill prevention, control, and countermeasure plan in accordance with federal requirements (40 CFR Part 112) and any other state or local requirements to outline spill prevention plans and measures to contain and clean up spills if they were to occur (EIS Appendix H, Mitigation and Monitoring). The applicant would also implement its OSRP (COP Appendix I-F; Epsilon 2022). Lastly, the proposed Project would use solid export cables that do not contain fluids. Due to the limited volume of potential pollutants involved in onshore construction (i.e., fluids contained in construction equipment), any accidental onshore releases that are not completely controlled by the proposed Project's precautionary measures and spill prevention, control, and countermeasure plan would result in **negligible** and short-term impacts on wetlands and water resources with which they come in contact. Offshore releases are discussed in EIS Section G.2.2.

**Climate change**: Climate change would contribute to impacts on non-tidal waters and wetlands primarily through existing global and regional climate trends. Phase 1 would have no measurable influence on this IPF. The intensity of impacts on non-tidal waters and wetlands resulting from climate change are uncertain but are anticipated to be **minor**.

**Land disturbance**: The proposed onshore substation sites and cable landing sites would not contain any freshwater or wetland resources. However, non-tidal waters and wetlands that are not found on publicly available maps may also be identified by pre-construction field surveys. As a result, installation of the Phase 1 onshore export cable could affect wetlands or wetland-adjacent areas.

The proposed Project would comply with all requirements of any issued permits and employ proper erosion and sedimentation controls. The proposed Project would comply with the federal CWA, the MassDEP, and local regulations to prevent degradation of rivers and streams. The use of HDD would avoid construction-related impacts in intertidal areas at the landing sites. The underground transition vault located at the selected onshore cable landing site would be installed outside of wetlands and waterbodies, within a paved roadway or parking lot, and would have a manhole cover at the ground surface.

Temporary, localized sedimentation and decreases in water quality in freshwater wetlands could occur from increased sedimentation during construction of the Phase 1 OECR and onshore substation (EIS Section G.2.2). All land disturbances from construction activities would be conducted in compliance with the NPDES 2022 Construction General Permit and the approved storm water pollution prevention plan for the proposed Project. In the event of fault or failure of the proposed Project's precautionary measures and storm water pollution prevention plan, sediment could enter non-tidal waters and wetlands. Such sedimentation could result in **negligible** impacts due to the short duration of increased sedimentation, and because the resource would be expected to return to existing conditions.

The onshore underground transition vault, cable route, and interconnection facility have no maintenance needs unless a fault or failure occurs; therefore, Phase 1 operations are not expected to impact non-tidal waters and wetlands. The onshore substation would house transformers and other electrical components that may leak hazardous fluids, such as dielectric fluid. In the event that repairs become necessary, any impacts would be similar to construction, but to a lesser degree, and short term and **negligible**.

Many of the onshore components could be retired in place or retained for future use, although removal of onshore cables via existing manholes may occur if required. The splice vaults, duct bank, and onshore substation would likely remain as valuable infrastructure that would be available for future offshore wind or other projects. To the extent that decommissioning of the onshore facilities occurs, the impacts from these decommissioning activities would be generally similar to the impacts experienced during construction.

***Impacts of Phase 2***

The potential impacts on non-tidal waters and wetlands resulting from Phase 2 would be similar to those described for Phase 1 for construction, operations, and decommissioning. The applicant has not yet defined the SCV OECC route within state waters in Buzzards Bay or the SCV OECR in Bristol County, Massachusetts. The impacts of the finalized SCV OECC and OECR route on wetlands and other waters of the U.S. will be evaluated in a supplemental NEPA analysis.

***Cumulative Impacts***

The cumulative impacts of Alternative B considered the impacts of the proposed Project in combination with other ongoing and planned wind activities. Ongoing and planned non-offshore wind activities described in Table G.1-19 would contribute to impact on tidal waters and wetlands through the primary IPFs of accidental releases and land disturbance. Cumulative impacts on tidal waters and wetlands would be **minor** due to occasional disturbance along onshore cable routes and at substation sites.

***Conclusions***

**Impacts of Alternative B.** Temporary low-level sedimentation of non-tidal waters and wetlands could occur during construction of the OECR and onshore substation. Little to no impacts from operations or decommissioning are anticipated. The impacts of Alternative B on non-tidal waters and wetlands would be short term and **negligible** because the impact would be small, and the resource would be expected to recover to existing conditions without remedial or mitigating action.

**Cumulative Impacts of Alternative B.** Considering all the IPFs together, the overall cumulative impacts of Alternative B and other ongoing and planned activities on tidal waters and wetlands would be **minor.** Impacts would be small in extent and short term, and the resources would be expected to return to existing conditions.

**Impacts of Alternative C – Habitat Impact Minimization Alternative on Wetlands and Other Waters of the United States**

Under Alternatives C-1 and C-2, all onshore proposed Project components and activities would be the same as those of Alternative B. Offshore impacts of Alternatives C-1 and C-2 would be similar to those described under Alternative B.

### G.2.7 Land Use and Coastal Infrastructure

#### G.2.7.1 Description of the Affected Environment

This section discusses existing conditions in the geographic analysis area for land use and coastal infrastructure, as described in Table D-1 in EIS Appendix D, Geographic Analysis Areas, and shown on Figure G.2.7-1. The geographic analysis area includes the following counties that contain onshore infrastructure or ports that may be used to support proposed Project construction or operations (EIS Section 2.1.2, Alternative B – Proposed Action):

- Onshore proposed Project infrastructure (landfall sites, cable routes, substations, electrical grid interconnection routes)
  - Massachusetts: Barnstable and Bristol counties
- Ports
  - Massachusetts: Bristol, Dukes, and Essex counties
  - Rhode Island: Providence and Washington counties
  - Connecticut: Fairfield and New London counties
  - New York: Albany, Kings, Rensselaer, Richmond, and Suffolk counties
  - New Jersey: Gloucester County

Table G.1-20 describes existing conditions and impacts, based on the IPFs assessed, of ongoing and planned activities other than offshore wind, which is discussed below.

Land use and coastal infrastructure are diverse within coastal New Jersey, New York, Connecticut, Rhode Island, and Massachusetts due to the presence of large coastal population centers and coastal-dependent industries (marine transportation, fishing, recreation, and tourism), as well as residential, commercial, and industrial development, agricultural lands, and natural resource areas (forests, surface waters, and wetlands) (NOAA 2010). The larger metropolitan regions within the geographic analysis area include New York City and Albany, New York; Providence, Rhode Island; Bridgeport, Connecticut; and New Bedford and Fall River, Massachusetts.

As listed in Table G.2.7-1, all counties in the geographic analysis area experienced an increase in developed land cover between 2001 and 2019 (MRLC 2021). The Town of Barnstable, the primary location for planned landfall sites, OECR, and substations, is the largest community on Cape Cod in both land area and population and serves as the Barnstable County seat. Barnstable has a mix of low- to medium-density residential development, business, and industry, as well as extensive recreation and tourist-oriented commercial and public uses. Most of the town’s residential development has occurred in the last 40 years.

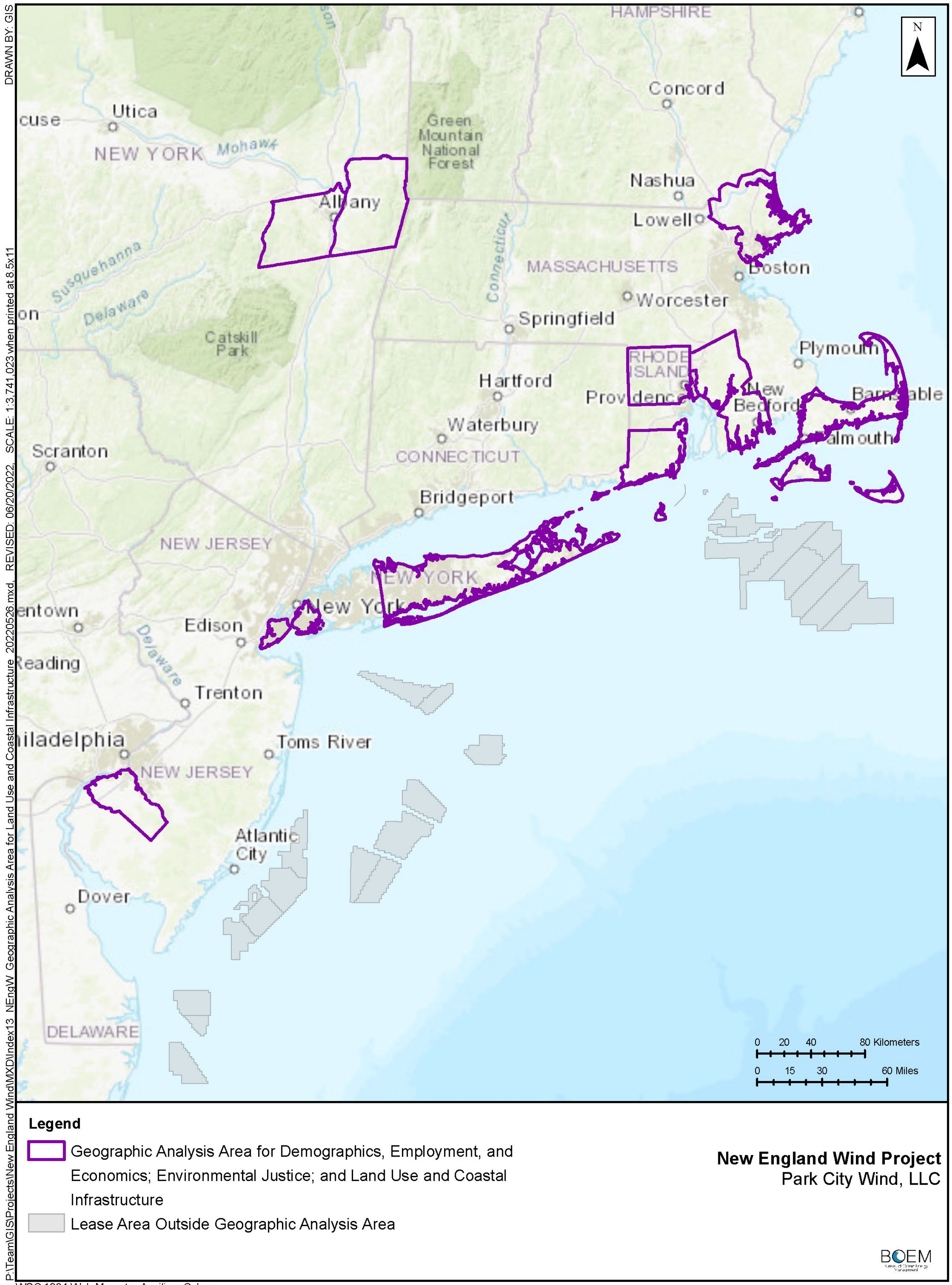



**Figure G.2.7-1: Geographic Analysis Area for Land Use and Coastal Infrastructure**

The Hyannis area (part of the Town of Barnstable) contains important regional assets, including two ferry terminals, the region's largest commercial airport, the Cape Cod Hospital, and a regional commercial area along Route 132 (Town of Barnstable 2010). Of the town's 38,500 acres, 29 percent is protected open space and 11 percent is public open space, public or private recreation, public use (including the airport), or private agriculture/forest lands (Town of Barnstable 2018). Working waterfronts are a long-established feature of Barnstable County's harbors, which support traditional fishing activities and recreational boating (Town of Barnstable 2010). The community plan for Barnstable recommends no substantial changes in land uses near proposed Project onshore facilities (Town of Barnstable 2010).

Barnstable County's developed land cover grew by 3.4 percent, with most of the newly developed land converted from forested land. Barnstable County's development patterns and growth pressures have resulted in concerns about loss of forest cover, surface water quality, the use of on-site septic systems that do not adequately protect water quality, climate change, lack of protection for historic buildings, inadequate affordable housing supply for year-round residents, and limited public infrastructure (Cape Cod Commission 2021).

**Table G.2.7-1. Developed Land Cover in Geographic Analysis Area**

| County | Developed Land Cover 2019 (%) | Increase in Developed Land Cover 2001–2019 (%) |
|---|---|---|
| Barnstable County, Massachusetts | 12.9 | 3.4 |
| Bristol County, Massachusetts | 27.6 | 11.8 |
| Dukes County, Massachusetts | 4.2 | 1.5 |
| Essex County, Massachusetts | 24.9 | 7.3 |
| Fairfield County, Connecticut | 34.7 | 4.7 |
| New London County, Connecticut | 15.7 | 5.4 |
| Gloucester County, New Jersey | 34.2 | 15.3 |
| Albany County, New York | 22.3 | 7.3 |
| Kings County, New York | 67.2 | 0.3 |
| Rensselaer County, New York | 12.1 | 10.0 |
| Richmond County, New York | 42.5 | 2.1 |
| Suffolk County, New York | 22.8 | 3.7 |
| Providence County, Rhode Island | 32.2 | 6.4 |
| Washington County, Rhode Island | 13.5 | 5.1 |

Source: MRLC 2021

As listed in Table G.2.7-2, proposed Project construction and operations may be supported by ports or terminals located within land use contexts that include large and small cities, suburban areas, and small towns. The primary long-term shore base for operations is most likely to be within the Port of Bridgeport, with crew transfer vessels (CTV) and service vessels also operating out of Vineyard Haven Harbor and the Port of New Bedford. Other port facilities identified as possibly supporting proposed Project construction, operations, or decommissioning are listed in Table G.2.7-2 (COP Volume III; Epsilon 2022). The proposed Project may also use ports in Canada, which are not within the scope of BOEM's analysis.

These sites are generally industrial in character, or adjacent to other industrial or commercial land uses, and have access to major transportation corridors (COP Volume III; Epsilon 2022). The sections below briefly characterize the jurisdictions and port or terminal facilities listed in Table G.2.7-2.

**Table G.2.7-2: Port Facilities by County**

| County | Potential Port Usage, Construction, Operations, and Decommissioning (Site Type)[a] |
|---|---|
| Bristol County, Massachusetts | Port of New Bedford (E)<br>Brayton Point Commerce Center (P)<br>Fall River terminal facilities (P) |
| Dukes County, Massachusetts | Vineyard Haven Harbor (E) |
| Essex County, Massachusetts | Salem Offshore Wind Port (P) |
| Fairfield County, Connecticut | Port of Bridgeport (E) |
| New London County, Connecticut | Port of New London (E) |
| Gloucester County, New Jersey | Paulsboro Marine Terminal (E) |
| Albany County, New York | Port of Albany Beacon Island expansion (P)<br>Port of Coeymans (E) |
| Kings County, New York | GMD Shipyard (E)<br>South Brooklyn Marine Terminal (E) |
| Rensselaer County, New York | New York State Offshore Wind Port (P) |
| Richmond County, New York | Homeport Pier (P)<br>Arthur Kill Terminal (G) |
| Suffolk County, New York | Shoreham site (P)<br>Greenport Harbor (E)[b] |
| Providence County, Rhode Island | ProvPort (E)<br>South Quay Terminal (G) |
| Washington County, Rhode Island | Port of Davisville (E) |

Source: COP Volume III; Epsilon 2022

ProvPort = Port of Providence

[a] Site types include the following:
E: Existing ports or industrial terminals that may be expanded to serve the offshore wind industry
P: Industrial facilities proposed for redevelopment to serve offshore wind activities, regardless of the status of the proposed Project
G: Greenfield sites that have not been previously developed

[b] This site is for operations only.

## Bristol County, Massachusetts

Bristol County is in southeast Massachusetts, bordered by Rhode Island to the west, Buzzards Bay to the south, and Plymouth County to the east. It contains the Port of New Bedford and Brayton Point Commerce Center.

The City of New Bedford is a densely developed, historic, manufacturing center, and port within Bristol County. The city's master plan establishes goals that include developing emerging industry sectors, linking brownfields and historic mills with new development opportunities, diversifying industries in the Port of New Bedford, supporting traditional harbor industries, and promoting sustainable neighborhoods (Vanasse Hangen Brustlin, Inc. 2010). The Port of New Bedford is within New Bedford's extensive industrial waterfront, adjacent to the Acushnet River estuary, which empties into Buzzard Bay. The port contains the New Bedford Marine Commerce Terminal, a facility owned by the Massachusetts Clean Energy Center, developed with support from the Commonwealth of Massachusetts to serve the offshore wind energy industry.

The Brayton Point Commerce Center is the site of the former coal-fired Brayton Point Power Plant, a 307-acre property located on Mount Hope Bay, less than 1 mile from Interstate 195. The site owners plan to develop the former power plant site as a port, manufacturing hub, and support center for the offshore wind industry.

Fall River is the second most populous city in Bristol County (after New Bedford), located on the eastern shore of Mount Hope Bay at the mouth of the Taunton River. Like New Bedford, Fall River was historically a manufacturing and port city. Several Fall River waterfront port and industrial facilities have been identified by the Massachusetts Clean Energy Center as potential offshore wind ports and could be used by the applicant if the necessary upgrades are made by the owner(s)/lessor(s).

**Dukes County, Massachusetts**

Dukes County consists of Martha's Vineyard and ten neighboring islands off the southeast coast of Massachusetts. Vineyard Haven Harbor in the Town of Tisbury on Martha's Vineyard is a year-round working port, home to most of the boatyards on Martha's Vineyard. Small coastal tankers and ferries regularly use Vineyard Haven Harbor to transport freight, vehicles, and passengers (COP Volume III; Epsilon 2022). The area of Tisbury near the Vineyard Haven Harbor is a mix of marine-related, commercial, and residential uses. Approximately 2 percent of Martha's Vineyard is zoned for commercial or industrial use, 40 percent is preserved from development, and nearly all the remaining land area is developed for residential uses (Martha's Vineyard Commission 2010).

**Essex County, Massachusetts**

Essex County is a coastal county north of Boston. The Town of Salem contains Salem Harbor, which provides marine recreational, water transportation, and commercial uses (COP Volume III; Epsilon 2022). The recently commissioned Salem Harbor Power Station natural gas power plant replaced a coal and oil plant along Salem's waterfront in 2018. The decommissioning opened 42 acres of available land that is proposed for development as the Salem Offshore Wind Port, a facility that could support staging activities, storage, and assembly of components such as blades, nacelles, and tower sections in preparation for offshore installation (City of Salem 2021).

**Fairfield County, Connecticut**

Fairfield County in southwestern Connecticut contains the City of Bridgeport, an historic waterfront manufacturing center. Bridgeport experienced deindustrialization during the latter half of the twentieth century and is seeking new investment, expanded economic opportunities, and new waterfront development that provides a mix of land uses and public amenities (City of Bridgeport 2017, Metrocog 2015). The Port of Bridgeport, which includes Bridgeport Harbor and Black Rock Harbor, has several private cargo facilities that handle a range of goods, including petroleum products; break-bulk cargo; and sand, gravel, and coal (COP Volume III; Epsilon 2022).

**New London County, Connecticut**

New London County in southeastern Connecticut contains the City of New London, located on the Atlantic coast at the mouth of the Thames River. The City of New London's downtown waterfront is developed with water-dependent uses including piers, docks, marinas, port facilities, shipyards, and ferry terminals (COP Volume III; Epsilon 2022). A 1,000-foot-long cargo pier, the Admiral Harold E. Shear State Pier (state pier), is planned to be redeveloped to serve offshore wind development through a private-public partnership between the Connecticut Port Authority, Eversource, and Ørsted (COP Volume III; Epsilon 2022). Although located within downtown New London, the state pier has highway access from Interstate 95 via major arterial roads and local roads that serve an industrial area.

**Gloucester County, New Jersey**

Gloucester County in southwestern New Jersey contains the City of Paulsboro on a stretch of the Delaware River that hosts numerous refineries and other fossil fuel facilities. The Paulsboro Marine Terminal, located on the Delaware River at the site of a former BP oil terminal, has been suggested as the site of an offshore wind monopile factory (NJB Magazine 2021). At full buildout, the Paulsboro Marine Terminal could include three vessel berths and a barge berth (COP Volume III; Epsilon 2022).

**Albany County, New York**

Albany County has two potential port facilities along the Hudson River that could support the proposed Project. The Port of Coeymans is an existing 400-acre, privately owned marine terminal approximately 11.5 miles south of the City of Albany (COP Volume III; Epsilon 2022). It is an industrial terminal used for large-scale construction projects, bulk commodities, break-bulk, heavy lift items, and containers.

The Albany Port District Commission has proposed to expand the Port of Albany by developing approximately 81.5 acres of riverfront property on Beacon Island in Glenmont, New York (south of downtown Albany) as a manufacturing facility, staging area, and bulkhead for on- and off-loading of equipment, materials, and offshore wind farm components (COP Volume III; Epsilon 2022). The Beacon Island site is vacant, former industrial land.

**Kings County, New York (New York City, Brooklyn Borough)**

Kings County is coterminous with the Brooklyn Borough of New York City. The South Brooklyn Marine Terminal is an existing port with two piers on the Upper Bay of New York Harbor (COP Volume III; Epsilon 2022). The port is proposed to be upgraded to support staging, installation, and maintenance activities for offshore wind. The existing site hosts parking lots, utility buildings, warehouses, and an operational railroad. The terminal is in a heavily industrialized waterfront area with residential and commercial uses nearby. The GMD Shipyard is a full-service shipyard (ship repair and servicing) located within the Brooklyn Navy Yard on the East River (COP Volume III; Epsilon 2022).

**Rensselaer County, New York**

Across the Hudson River from Albany County, the New York State Offshore Wind Port is proposed to be constructed on currently vacant land in East Greenbush, Rensselaer County, New York. The 30-acre facility would be part of a proposed 112-acre industrial development south of the City of Albany (COP Volume III; Epsilon 2022).

**Richmond County, New York (New York City, Staten Island Borough)**

Richmond County is coterminous with the Staten Island Borough of New York City. The proposed Arthur Kill Terminal is a greenfield site on Staten Island that would be developed into a 32-acre port facility designed for the staging and assembly of offshore wind farm components. The Arthur Kill Terminal site is surrounded by developed land uses that include low-density commercial uses and marine industrial facilities, both active and unused (COP Volume III; Epsilon 2022). Richmond County also contains the Homeport Pier, a former naval base with an existing pier approximately 2 miles north of the Verrazano-Narrows Bridge. The New York City Economic Development Corporation is exploring the potential development of the site to support the offshore wind industry (COP Volume III; Epsilon 2022).

**Suffolk County, New York**

Suffolk County covers the eastern portion of Long Island. The 700-acre Shoreham site contains the non-operating Shoreham Nuclear Power Plant buildings and has been identified by the New York State Energy Research and Development Authority as a potential site for offshore wind port facilities (COP Volume III; Epsilon 2022). The site, on Long Island Sound and surrounded by a creek, marshlands, and residential properties, would require significant investment and upgrades to create a waterfront terminal (COP Volume III; Epsilon 2022).

Greenport Harbor is an existing facility at the northeastern tip of Long Island with commercial docks that could be rented to offshore wind developers and used for provisioning, crew changes, weather standby, repairs, equipment change, and possibly fuel and water delivery (COP Volume III; Epsilon 2022).

**Providence County, Rhode Island**

The proposed Project may use port facilities at ProvPort and/or South Quay Terminal in Providence County, Rhode Island's northernmost county and home of the City of Providence, the state's largest municipality. ProvPort is a privately owned marine terminal located within the City of Providence that occupies approximately 115 acres along the Providence River. ProvPort is Rhode Island's principal commercial port and has interstate highway and rail access (COP Volume III; Epsilon 2022). The South Quay Terminal is a 30+ acre greenfield site located on the Providence River in the City of East Providence. Waterfront Enterprises, LLC has announced plans to develop a staging area for offshore wind construction at the site, as well as other mixed uses (COP Volume III; Epsilon 2022).

**Washington County, Rhode Island**

Washington County is Rhode Island's coastal county and is characterized by rural farming enclaves, seasonal beach communities, and low-density residential development (COP Volume III; Epsilon 2022). The Port of Davisville is near the mouth of Narragansett Bay and within the 3,212-acre Quonset Business Park in North Kingstown, a former military installation (COP Volume III; Epsilon 2022). The Port of Davisville offers five terminals, piers, a bulkhead, on-dock rail, and laydown and terminal storage. Ongoing renovations at the Port of Davisville's Pier 2 to service the offshore wind industry include constructing a new steel bulkhead, dredging to accommodate larger ships, and extending piers. The Port of Davisville currently hosts marine service businesses, industrial uses, and recreational boating uses.

### G.2.7.2 Environmental Consequences

Definitions of impact levels for land use and coastal infrastructure are described in Table G.2.7-3.

**Table G.2.7-3: Impact Level Definitions for Land Use and Coastal Infrastructure**

| Level | Impact Type | Definition |
|---|---|---|
| Negligible | Adverse | Adverse impacts on area land use would not be detectable. |
| | Beneficial | Beneficial impacts on area land use would not be detectable. |
| Minor | Adverse | Adverse impacts would be detectable but would be short term and localized. |
| | Beneficial | Beneficial impacts would be detectable but would be short term and localized. |
| Moderate | Adverse | Adverse impacts would be detectable and broad based, affecting a variety of land uses, but would be short term and would not result in long-term change. |
| | Beneficial | Beneficial impacts would be detectable and broad based, affecting a variety of land uses, but would be short term and would not result in long-term change. |
| Major | Adverse | Adverse impacts would be detectable, long term, and extensive, and result in permanent land use change. |
| | Beneficial | Beneficial impacts would be detectable, long term, and extensive, and result in permanent land use change. |

**Impacts of Alternative A – No Action Alternative on Land Use and Coastal Infrastructure**

When analyzing the impacts of Alternative A on land use and coastal infrastructure, BOEM considered the impacts of ongoing activities including ongoing non-offshore wind and ongoing offshore wind activities on the existing conditions for land use and coastal infrastructure (Table G.1-20). The cumulative impacts of Alternative A considered the impacts of Alternative A in combination with other planned non-offshore wind and offshore wind activities, as described in EIS Appendix E, Planned Activities Scenario.

Under Alternative A, existing conditions for land use and coastal infrastructure described in Section G.2.7.1 would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore wind activities within the geographic analysis area that contribute to impacts on land use and coastal infrastructure include onshore and coastal regional trends, development projects, and port expansion (Table G.1-20). The geographic analysis area lies within developed communities that would experience continued commerce and development activity in accordance with established land use patterns and regulations. The ports would continue to serve marine traffic and industries, without the new activity that the proposed Project would generate.

Ongoing offshore wind activities within the geographic analysis area that contribute to impacts on land use and coastal infrastructure include construction of the landfall sites, onshore cables, and substations for the Vineyard Wind 1 project in Barnstable County. To the degree that planned offshore wind activities involve landfall locations and cable routes in Bristol County, these projects could contribute to the impacts of the SCV. Ongoing and planned activities (including offshore wind) would affect land use and coastal infrastructure through the primary IPFs described below.

***Cumulative Impacts***

The cumulative impact analysis for Alternative A considers the impacts of Alternative A in combination with other planned non-offshore wind activities and planned offshore wind activities (other than Alternative B). Future offshore wind development activities would affect land use and coastal infrastructure through the following primary IPFs.

**Accidental releases:** Accidental releases of fuel/fluids/hazardous materials may increase as a result of future offshore wind activities. The risk of accidental releases would be increased primarily during construction but also during operations and decommissioning of offshore wind facilities. BOEM assumes all projects and activities would comply with laws and regulations to minimize releases. Accidental releases could result in temporary restrictions on use of adjacent properties and coastal infrastructure during the cleanup process. The exact extent of impacts would depend on the locations of landfall, substations, and cable routes, as well as the ports that support future offshore wind energy projects. Based on the discussion in EIS Section G.2.2, Water Quality, the impacts of accidental releases on land use and coastal infrastructure would be localized and short term (except in the case of very large spills that affect a large land or coastal area).

**Land disturbance:** Future offshore wind construction would require installation of onshore transmission cable infrastructure and substations, which would cause temporary land disturbance and could temporarily affect access to adjacent properties. These impacts would only last through construction and rarely occur during operations events. The exact extent of impacts would depend on the locations of landfall and onshore transmission cable routes for future offshore wind energy projects; however, Alternative A would generally have localized and short-term impacts due to land disturbance during construction or maintenance.

**Lighting:** The permanent aviation warning lighting required for offshore wind WTGs would be visible from some beaches and coastlines and could affect land use if coastal views of the lighting influences property values or visitor/resident decisions in selecting coastal residential, business, or recreational locations to visit, rent, or buy. A 2017 visual preference study conducted by North Carolina State University evaluated the impact of offshore wind facilities on vacation rental prices. The study found that nighttime views of aviation hazard lighting (without ADLS) for WTGs close to shore (5 to 8 miles) could impact the rental price of properties with ocean views (Lutzeyer et al. 2017). The study does not specifically address the relationship between lighting, nighttime views, and tourism for WTGs 15 or more miles from shore.

Aviation hazard lighting from all 903 WTGs in the RI/MA Lease Areas (other than the proposed Project) could potentially be visible from beaches and coastal areas in and near the geographic analysis area for land use and coastal infrastructure (EIS Appendix E). Of the 903 WTGs that would be added within the geographic analysis area, 692 WTGs could be within 37.5 miles of the coastlines of Martha's Vineyard and Nantucket (the limit for visibility of nacelle-tops, assuming a 725-foot above mean sea level maximum nacelle-top height, as viewed from sea level). Visibility would depend on distance from shore, topography, and atmospheric conditions but would generally be localized, constant, and long term (EIS Section 3.16, Scenic and Visual Resources). BOEM assumes that FAA hazard lighting for offshore wind projects in the RI/MA Lease Areas would use ADLS. ADLS would activate the aviation warning lighting only when aircraft approach WTGs, reducing the visibility and associated land use impacts associated with WTG lighting.

Nighttime lighting from onshore electrical substations could affect the desirability of nearby properties or decisions about where to establish permanent or temporary residences. The extent of lighting impacts would depend on the substation locations and the lighting design but would generally be localized, constant, and long term.

**Noise:** Use of ports for offshore wind construction would generate localized noise from road and marine traffic and equipment usage for the duration of the construction period. Noise impacts would increase if multiple projects rely on the same port and overlap in time. Short-term noise would result from installation of onshore cables and substations. Noise resulting from offshore wind construction would have less impact on land use and coastal infrastructure within the context of an existing port or industrial area than if it occurred near a residential land use. Operations would generate lower levels of port activity and related noise.

**Port utilization:** Future offshore wind activity could necessitate port expansion in the geographic analysis area, including coastal New Jersey, New York, Connecticut, Rhode Island, and Massachusetts. Offshore wind would likely increase port utilization, and ports would experience beneficial impacts such as support for maintenance and improvements, 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.

If multiple future offshore wind energy projects are constructed at the same time and rely on the same ports, this simultaneous use could stress port resources and increase the marine traffic in the area. As described in Section G.2.7.1, new or expanded port, terminal, and manufacturing facilities are proposed to support offshore wind development within the geographic analysis area.

While no single new or expanded port facility is associated with a specific offshore wind project, completion of the projects included in Alternative A would likely result in numerous port or terminal expansions, including new manufacturing and staging facilities, within the geographic analysis area

(EIS Appendix E). Many of these actions would provide redevelopment and improvements for vacant or under-used industrial waterfront sites. Individual port upgrades and expansions would be reviewed through required local, state, and federal permitting and are not part of this assessment. Overall, Alternative A would have constant, long-term, beneficial impacts on port development and utilization due to the productive use of ports and other lands designated or appropriate for offshore wind activity, as well as localized, short-term impacts in cases where individual ports and surrounding coastal areas experience marine traffic congestion and scarcity of port facilities (docks, laydown areas, storage).

**Presence of structures:** During operations, the views of offshore wind WTGs from coastal locations within the geographic analysis area could affect land use if the views affect property values or visitor/resident decisions in selecting coastal locations to visit or buy. Based on the currently available studies, portions of all 903 WTGs associated with Alternative A could be visible from some shorelines (depending on vegetation, topography, and atmospheric conditions), of which up to 50 (fewer than 5 percent) would be within 15 miles of shore (EIS Section 3.16). Visibility would vary with distance from shore, topography, and atmospheric conditions and would generally be localized, constant, and long term, with minimal impacts on land use. While the views may influence some individual decisions, the visual impacts would not alter land use patterns or reduce the use of coastal infrastructure (Gibbons 2015; Parsons and Firestone 2018; Lutzeyer et al. 2017).

The presence of onshore, underground transmission cable infrastructure would have minimal long-term impacts on land use because these would typically be collocated with roads and/or other utilities. The impacts of new substations would depend on their location and design (especially sound attenuation and vegetative screening). With appropriate design, the operation of substations and cable conduits would not affect the established and planned land uses for a local area.

**Traffic:** Vehicle traffic generated by offshore wind construction would occur between supply sources and ports used to support construction. Traffic would be distributed among the various ports that would be used and could result in periodic, short-term congestion due to transportation of offshore wind components to the ports, and especially the movement of slow-moving, oversized loads. Congestion on port access roads could also result from the volume of traffic generated, especially if multiple projects rely on the same port and overlap in time. Installation of onshore cables would result in short-term road delays and congestion during the placement of cable ducts within the ROWs of existing roads. Traffic delays and congestion would have localized, short-term impacts on land uses adjoining the affected roads or relying on the affected roads for access or travel. Operations would generate lower levels of port activity and related traffic.

***Conclusions***

**Impacts of Alternative A.** Under Alternative A, land use and coastal infrastructure in the geographic analysis area would continue to be affected by ongoing activities, especially onshore and coastal regional trends, development projects, and port expansion. The geographic analysis area lies within developed communities that would experience continued commerce and development activity in accordance with established land use patterns and regulations. The ports would continue to serve marine traffic and industries, without the new activity that the proposed Project would generate. The identified IPFs relevant to land use and coastal infrastructure are accidental releases; land disturbance from construction; nighttime lighting of substations; noise from construction, port activities, and substation operation; port utilization, presence of structures; presence of onshore infrastructure (especially new or expanded substations); and traffic generation.

Ongoing activities—especially onshore and coastal commerce, industry, and construction projects—would have **minor** impacts, both adverse and beneficial, on the geographic analysis area (the port areas and Barnstable). Accidental releases, land disturbance, road traffic, and construction-related noise could have temporary impacts on local land uses, but ongoing use and development undergirds the region's diverse mix of land uses and provides support for continued maintenance and improvement of the coastal infrastructure essential to the ports and harbors. The jurisdictions within the geographic analysis area would experience a continued need to protect natural resources while attracting new economic development, providing or upgrading infrastructure, and ensuring a reasonable housing supply.

**Cumulative Impacts of Alternative A.** Planned activities other than offshore wind, primarily increased port maintenance and expansion and construction activity, would have impacts similar to ongoing activities, with **minor** impacts, both adverse and beneficial. The combination of ongoing and planned activities would result in **minor** cumulative impacts, both adverse and beneficial, on land use and coastal infrastructure.

Considering all the IPFs, ongoing and future activities including future offshore wind activities near the geographic analysis area would result in **minor** cumulative impacts, both adverse and beneficial. Future offshore wind would affect land use through land disturbance (during installation of onshore cable and substations), road traffic, noise, and accidental releases during onshore construction, intensive use of ports, and views of offshore structures that could affect the use of onshore properties. The presence of new substations could also affect land use if not properly located and screened. Beneficial impacts on land use and coastal infrastructure would occur because the development of offshore wind (excluding the proposed Project) would support the productive use of ports and related lands and infrastructure designed or appropriate for future offshore wind activity (including construction, operations, and decommissioning).

**Relevant Design Parameters and Potential Variances in Impacts**

The proposed Project design parameters described below (EIS Appendix C, Project Design Envelope and Maximum-Case Scenario) would influence the magnitude of the impacts on land use and coastal infrastructure:

- The Phase 1 landfall site selected (Craigville Beach or Covell's Beach) and the selected Phase 1 onshore cable route (the Oak Street Route or Shootflying Hill Road Route) and grid interconnection route (the grid interconnection route or the variant).
- The substation design for Phase 1, including:
  - Whether the substation is installed entirely within the parcel at 8 Shootflying Hill Road or whether some of the onshore substation equipment is instead placed on Parcel #214 001, immediately southeast of the West Barnstable Substation;
  - Design of sound attenuation walls on the west side of the parcel at 8 Shootflying Hill Road; and
  - Design of landscaping provided for visual screening.
- The location of the substations and onshore cable route for Phase 2.
- The time of year in which construction occurs. For Phase 1, the applicant would adhere to summer limitations on construction activities on Cape Cod by generally scheduling onshore construction to occur after Labor Day and before Memorial Day, outside of the busiest tourist season. Cable installation may continue through June 15 with permission from the Town of Barnstable (COP Volume III; Epsilon 2022). If proposed Project delays were to change this schedule, the impacts on roads and land uses during the busy tourist season would be exacerbated. No scheduling commitments are made in the COP for Phase 2, but the applicant would consult with the Town of Barnstable regarding the construction schedule for Phase 1 and Phase 2.

- The development of a Traffic Management Plan (TMP) in coordination with municipal authorities to manage the impacts of onshore construction, especially cable duct bank installation. A TMP can reduce impacts on land uses along routes affected by construction.
- The port facilities chosen for construction support.

Changes to the number or design capacity of offshore wind turbines would not alter the maximum potential impacts on land use and coastal infrastructure because the number of turbines would not affect onshore infrastructure or port utilization.

**Impacts of Alternative B – Proposed Action on Land Use and Coastal Infrastructure**

This section identifies potential impacts of Alternative B on land use and coastal infrastructure.

***Impacts of Phase 1***

Phase 1 would affect land use and coastal infrastructure through the following primary IPFs during construction, operations, and decommissioning.

**Accidental releases:** Accidental releases from construction could include release of fuel/fluids/hazardous materials as a result of port usage and installation of the onshore cables and substation. BOEM assumes all activities would comply with laws and regulations to minimize releases. Accidental releases would result in temporary restriction on the use of adjacent properties and coastal infrastructure during the cleanup process. Accordingly, accidental releases from Phase 1 would have localized, short-term, and **negligible** to **minor** impacts on land use and coastal infrastructure.

Accidental releases from Phase 1 during operations could include release of fuel/fluids/hazardous materials as a result of port usage and substation operation. BOEM assumes all activities would comply with laws and regulations to minimize releases. The impact of accidental releases on land use and coastal infrastructure could result in temporary restriction on use of adjacent properties and coastal infrastructure during the cleanup process.

The proposed substation site is within Barnstable's Groundwater Protection Overlay District. The applicant plans to provide full-volume (110 percent) containment systems for components using dielectric fluid at the substation site, including Parcel #214-001. The containment would fully contain the dielectric fluid in the event of a complete, catastrophic equipment failure. Also included in the design is a common drain system that routes each individual containment area after passing through an oil-absorbing inhibition device to an oil/water separator before draining to the infiltration basin (COP Volume III; Epsilon 2022). Mitigation to provide additional containment for an extreme rain event, included in EIS Appendix H, Mitigation and Monitoring, would provide for the probable maximum precipitation event in a 24-hour period, as determined in consultation with the Town of Barnstable (EIS Section G.2.2, Water Quality). This mitigation would further reduce the potential impact of accidental releases on land use (COP Volume III; Epsilon 2022).

With the additional containment mitigation listed in EIS Appendix H, accidental releases from Phase 1 would have localized, short-term, and **negligible** to **minor** impacts on land use and coastal mitigation.

Decommissioning would require vessel and equipment usage for removal of offshore structures. Onshore cables, if removed, would require truck-mounted equipment but would not require land disturbance. Accidental releases could include release of fuel/fluids/hazardous materials as a result of vessel and equipment usage, with localized, short-term, and **negligible** to **minor** impacts on land use and coastal infrastructure.

**Land disturbance:** Installation of the landfall sites and onshore cables and construction of the substations would temporarily disturb neighboring residential land uses through construction noise, vibration, dust, and travel delays along the impacted roads.

The proposed new substation site and surrounding properties are in the Town of Barnstable's RF and RF-1 residential zoning districts. Both of these districts require a 1-acre minimum lot size (Town of Barnstable 2021). The new substation would also be within the town's Groundwater Protection Overlay District. The substation site is currently improved by a vacant motel building that would be removed. Land uses surrounding the proposed substation site include three single-family residences on wooded lots to the west and undeveloped, wooded land owned by the Cape Cod Chamber of Commerce to the east (Town of Barnstable 2022). East of the Chamber of Commerce parcel is unimproved, wooded land bordering State Route 132 and owned by the Commonwealth of Massachusetts Department of Public Works. To the south of the proposed new substation is a cleared transmission line ROW, approximately 270 feet wide, and south of the transmission line are two unimproved, wooded lots that are privately owned and part of a residential subdivision. To the north, across Shootflying Hill Road from the proposed substation site, is a 160-foot-wide strip of undeveloped, wooded land that is part of the ROW of U.S. Route 6 (the Mid-Cape Highway). To the north of the wooded strip is a ramp to the interchange of U.S. Route 6 with State Route 132.

The proposed expansion of the West Barnstable Substation is also within and surrounded by the RF residential zoning district. The expansion area is bordered to the east by an undeveloped wooded property owned by an electric utility. East of the utility-owned parcel is wooded land owned by the Town of Barnstable Conservation Commission and the Barnstable State Forest. To the west of the expansion area is the existing West Barnstable Substation, and to the south is U.S. Route 6, a four-lane divided highway with a wooded median. Single-family residences are separated from the proposed expansion area by the existing substation and an undeveloped, wooded lot owned by an electric utility company.

Substations are not an itemized permitted use within any zoning district under the Barnstable zoning ordinance; however, Massachusetts General Law Chapter 40A, § 3 provides that the Massachusetts Energy Facility Siting Board may exempt a public service corporation from particular local zoning provisions based on findings that the proposed use of the land or structure is reasonably necessary for the convenience or welfare of the public and the proposed use requires exemption from the zoning ordinance or bylaw.

The Phase 1 offshore export cables would transition onshore via HDD at one of two potential landfall sites:

- Craigville Public Beach Landfall Site is within a 3.5-acre paved parking area associated with a public beach that is owned and managed by the Town of Barnstable. Adjoining land uses include homes along the north side of Craigville Beach Road, a private beach club (Craigville Beach Club) and parking to the west, a private bathhouse and parking to the east (owned by the nearby Christian Campground), and undeveloped land.
- Covell's Beach Landfall Site is in a paved parking area associated with Covell's Beach, which is a residents-only beach owned by the Town of Barnstable. Residences and a building associated with the public beach are west of the landfall site, between Craigville Beach Road and the beach. Residential neighborhoods (single-family homes and one multi-family community) are located on both sides of the road to the north and northeast.

Landfall site construction would reduce the public parking available for Craigville or Covell's Beach during the construction period. Upon completion, the applicant would repave and restore disturbed areas to match existing conditions. This analysis assumes that upon restoration, the available parking area would be the same as before construction. Construction activities at the landfall site are not anticipated to be performed between June and September (the peak period for beach use) unless authorized by the Town of Barnstable.

Table G.2.7-4 shows that the cable route from the two potential landfall sites to the substation would be approximately 4.0 to 6.1 miles, depending on the landfall site and exact route selected.

In addition to the OECR, an underground interconnection cable would be installed from the Phase 1 substation to the existing West Barnstable Substation (COP Volume I, Section S-3.1.7; Epsilon 2022). The interconnection route would have a length of 0.6 mile if it follows existing transmission line ROWs, or 1.8 miles if it follows roads (Service Road, Route 132, and Oak Street). Adjoining land along Oak Street and the transmission line ROW is single-family residential and wooded, undeveloped land. Route 132 is bordered by undeveloped wooded land and commercial and civic uses, including a community college campus and a YMCA.

**Table G.2.7-4: Phase 1 Onshore Cable Routes**

| Road or ROW Used | Distance (miles) | Comments and Primary Adjoining Land Uses |
|---|---|---|
| **Shootflying Road Onshore Cable Route** | | |
| Craigville Beach Road | 0.5 | Single-family residential and Centerville River |
| Main Street | 0.5 | Centerville Historic District. Single-family residential and civic |
| Old Stage Road | 0.7 | Single-family residential, cemetery, commercial and apartments at intersection with Route 28, water tower |
| Shootflying Hill Road | 2.2 | Single-family residential, undeveloped wooded, public (parking, boat ramp and lake access) |
| ROW #343 | 0.1 | Single-family residential, wooded |
| Total Distance, Shootflying Road Route | **4.0** | |
| **Shootflying Road Route Variant 1[a]** | | |
| Craigville Beach Road | 1.0 | Beach-related parking and visitor buildings, single-family residential and commercial |
| Total Distance, Variant 1 | **1.0** | |
| **Shootflying Road Route Variant 2[a]** | | |
| South Main Street | 0.7 | Commercial, civic, single-family residential |
| Main Street | 0.4 | Single-family residential |
| Mothers Park Road | 0.1 | Single-family residential, public park |
| Phinneys Lane | 0.4 | Single-family residential, cemetery |
| Great Marsh Road | 0.8 | Single-family residential |
| Total Distance, Variant 2 | **2.4** | |
| **Shootflying Road Route Variant 3[a]** | | **In lieu of ROW #343** |
| Continue on Shootflying Hill Road | 0.2 | Wooded, residential |
| Total Distance, Variant 3 | **0.2** | |
| **Oak Street Route** | | |
| Craigville Beach Road | 0.5 | Single-family residential and Centerville River |
| South Main Street | 0.7 | Commercial, civic, single-family residential |
| Main Street | 0.4 | Single-family residential |
| Mothers Park Road | 0.1 | Single-family residential, public park |
| Phinneys Lane | 0.4 | Single-family residential, cemetery |
| Great Marsh Road | 0.9 | Single-family residential |
| Old Stage Road | 1.3 | Single-family residential, cemetery, commercial and apartments at intersection with Route 28, water tower |
| Oak Street | 1.0 | Single-family residential and undeveloped wooded |
| Service Road | 0.8 | Single-family residential and undeveloped wooded |
| Shootflying Hill Road | 0.0 | Residential |
| Total Distance, Oak Street Route | **6.1** | |

| Road or ROW Used | Distance (miles) | Comments and Primary Adjoining Land Uses |
|---|---|---|
| **Oak Street Route Variant 1[b]** | | |
| Old Stage Road | 0.9 | Uses utility ROW #345 between Old Stage Road and Substation Site and shortens route but requires tree clearing and wetland crossing |
| ROW #345 and #343 | 1.6 | Single-family residential, cemetery, commercial and apartments at intersection with Route 28, water tower |
| Total Distance, Oak Street Variant 1 | **2.5** | |

Source: COP Volume I; Epsilon 2022

ROW = right-of-way
[a] This excludes distance associated with other components of the main Shootflying Hill Road Route.
[b] This excludes distance associated with other components of the main Oak Street Route.

Construction disturbances would be temporary, lasting up to 1 year for OECR installation (excluding the June through August peak tourist season); however, the applicant would complete construction at any one location in a shorter time period (days or weeks). Substation construction would occur over a 2-year period. Overall, land disturbance during installation of the Phase 1 landfall site and onshore cable ducts, and construction of the substation(s), would have localized, short-term, and **minor** impacts on land use and coastal infrastructure due to construction-related disturbance and temporary access restrictions to either the Craigville Beach or Covell's Beach parking lot.

The onshore substation site, onshore export cables, and splice vaults would require minimal maintenance, typically completed by accessing the cables through manholes or within the fenced perimeter of the substation, with no impacts on surrounding land uses or coastal infrastructure. Excavation for repairs would be rare and have **negligible** impacts on adjacent land uses.

During decommissioning, onshore cables may be retained for other use or removed. The removal of onshore cables would be accomplished without land disturbance or excavation.

**Lighting:** Phase 1 construction would require periodic, temporary nighttime lighting for offshore WTG construction, cable duct installation along the OECC, and substation construction. Visibility of offshore nighttime lighting during construction would be limited to the southern coasts of Martha's Vineyard, Nantucket, and adjacent islands and would depend on vegetation, topography, and atmospheric conditions. Onshore nighttime construction would result in lighting visible from adjacent and nearby properties and roads. As a result, lighting during Phase 1 construction would have a short-term, intermittent, and **negligible** impact on land use and coastal infrastructure in the geographic analysis area due to potential impacts on the use of property with views of construction lighting.

Phase 1 operations would include the nighttime use of aviation hazard avoidance lighting on WTGs and ESPs. Lighting from Phase 1 WTGs would not be visible from mainland Massachusetts but would be visible from certain coastal locations on Martha's Vineyard and Nantucket (COP Appendix III.H-a, Section 1.2; Epsilon 2022). The applicant anticipates using ADLS, which would activate Phase 1's WTG lighting when aircraft approach the WTGs, which is expected to occur less than 0.1 percent of annual nighttime hours. As a result, WTG lighting of up to 62 WTGs included in Phase 1 would have a long-term, continuous, and **negligible** impact on land use and coastal infrastructure in the geographic analysis area due to potential impacts on property use and value.

Nighttime security lighting for the proposed substation could result in glare and nuisance for nearby residential properties. The applicant would install evergreen plantings between the proposed substation and adjacent residential properties to the west (COP Appendix III-H.a; Epsilon 2022). BOEM would also require a lighting plan as listed in EIS Appendix H to ensure that lighting is shielded and directed to eliminate glare and spillover onto adjacent properties.

The Phase 1 expansion of the West Barnstable Substation would not be adjacent to developed residential lots but would be separated from the existing homes by an undeveloped, wooded lot (300 feet wide) and the existing substation site (300 feet wide, with no vegetative screening). Additional substation lighting impacts on land use would be minimal due to the distance from the residential lots to the new substation and would also be subject to a lighting plan required as mitigation (EIS Appendix H) to ensure that Phase 1-related lighting is directed downward and shielded to eliminate glare and light spillover.

Accordingly, with implementation of mitigation (EIS Appendix H), security lighting for the new substation and expansion of the West Barnstable Substation would have a long-term, continuous, and **negligible** to **minor** impact on land use due to potential impacts on the use and value of adjacent residential properties.

Decommissioning may require periodic, temporary nighttime lighting for offshore removal of the WTGs, with a short-term, intermittent, and **negligible** impact on land use and coastal infrastructure in the geographic analysis area.

**Noise**: Activities associated with Phase 1 construction would add incrementally to the noise and vibration typical for ports that support industrial activities and commercial shipping. These short-term impacts would not hinder use of nearby land uses or coastal infrastructure. OECR installation and substation construction would temporarily disturb neighboring residential, recreational, civic, and commercial land uses through construction noise and vibration. Construction-generated noise would have localized, short-term, and **minor** impacts on land use and coastal infrastructure.

The applicant intends to install noise attenuation shielding along the western boundary of the proposed new substation, adjacent to existing homes, or place the noise-producing equipment on the property adjacent to the existing West Barnstable Substation instead (COP Volume I; Epsilon 2022). Either option—effective noise attenuation or placement of noise-producing equipment adjacent to the West Barnstable Substation—would mitigate substation noise during operations for the residences to the west. The undeveloped property to the east is owned by the Barnstable Chamber of Commerce and as such may be developed for uses that are less noise-sensitive than residences. Nevertheless, given the residential use permitted by the underlying zoning, noise attenuation at the substation site along the eastern boundary would prevent substation noise from discouraging potential future development and use of that land in accordance with its residential zoning designation. Accordingly, BOEM would require noise attenuation along the east and west substation boundaries unless the noise-producing equipment is placed adjacent to the West Barnstable Substation (EIS Appendix H). The site adjacent to the West Barnstable Substation is separated from existing or potential residential development by the existing substation, Route 6, and conservation or state forest lands.

Maintenance operations along the OECC would produce rare, short-term noise. Port utilization would result in incremental noise generation typical of port operations. Subject to the mitigation for substation noise, the impact on land use and coastal infrastructure resulting from Phase 1 operational noise would be long term and **negligible** to **minor**.

Decommissioning would produce increased noise in the vicinity of ports due to port utilization and related road traffic and along the OECR if cables are to be removed, with short-term and **minor** impacts on land use and coastal infrastructure.

**Port utilization:** Land use and coastal infrastructure impacted by construction of offshore components would include the port facilities used for shipping, storing, and fabricating Alternative B components and the adjacent and nearby land uses. Alternative B includes no port expansion activities but would use ports that have expanded or will expand to support the wind energy industry. As described in Section G.2.7.1, potential ports are identified in Massachusetts, Connecticut, Rhode Island, New Jersey, and New York.

Ports in Canada may also be used but are outside of BOEM's jurisdiction; thus, the impacts are not evaluated. Port facilities have varying land use contexts and constraints and are designated by local zoning and land use plans for industrial or marine activity. While port facilities are typically adjacent to other industrial or commercial land uses or major transportation corridors, some are also close to residential neighborhoods.

Phase 1 may increase the level of port activity above the levels typically experienced at a particular facility, resulting in localized, short-term marine traffic congestion and scarcity of port facilities (i.e., docks, laydown areas, and storage). These short-term impacts would not hinder use of the ports, nearby land uses, or other coastal infrastructure. Overall, the construction of offshore components for Phase 1 would have **minor** beneficial impacts on land use and coastal infrastructure by supporting designated uses and infrastructure improvements at ports.

Operations facilities needed for Phase 1 would include offices, a control room, training space, and warehouse space, in addition to piers for CTVs and larger vessels such as service operation vessels (SOV). The applicant plans to establish a long-term SOV operations base in Bridgeport, Connecticut, with related warehousing and a control room located near this base. The Bridgeport property selected for the operations base is a 3-acre portion of an 18-acre waterfront parcel zoned by the City of Bridgeport for industrial and mixed use (COP Volume III; Epsilon 2022; City of Bridgeport 2018). The 18-acre waterfront parcel, currently vacant and without port infrastructure, is planned for improvements to serve as a staging facility for offshore wind construction (Durakovic 2021). The city's comprehensive plan calls for leveraging the economic value of the waterfront and encouraging development of brownfields and other underutilized or vacant industrial properties (City of Bridgeport 2019).

The applicant may operate CTVs or the SOV daughter craft out of Vineyard Haven on Martha's Vineyard or Greenport Harbor on Long Island, existing ports that support commercial, ferry, fishing, and recreational vessel traffic. Other ports listed in Table 2.1-4 could also be used to support operations activities. An existing port identified in Table 2.1-4 may be needed as an operations base on an interim basis if the facilities in Bridgeport are not available by the start of Phase 1 operations.

Overall, operations for Phase 1 would have **minor** beneficial impacts on land use and coastal infrastructure by supporting the economic development objectives of the Bridgeport comprehensive plan, the plan's designated land uses, and planned infrastructure improvements at ports.

Decommissioning would result in short-term use of port facilities that provide docking and storage facilities, with short-term, beneficial impacts. Upon completion of decommissioning, the impact of port utilization for operations would be reversed.

**Presence of structures:** Phase 1 WTGs could be visible from southern coasts of Martha's Vineyard, Nantucket, and nearby adjacent islands, depending on vegetation, topography, and atmospheric conditions (COP Appendix III.H-a, Section 1.2; Epsilon 2022). All of the 50 to 62 WTGs in Phase 1 would be more than 20 miles from coastal viewers, and the WTGs would not dominate offshore views. Phase 1 WTGs would have a long-term, continuous, and **negligible** impact on land use and coastal infrastructure in the geographic analysis area due to views of WTGs and the potential impacts on property use and value.

The Phase 1 proposed cable landfall site, cable route, and substation would be within the Town of Barnstable. From the surface, the only visible components of the cable system would be the manhole covers and substations (COP Volume I; Epsilon 2022). The cable route would follow roads and transmission line ROWs and would not displace or change any existing land uses.

The proposed new substation site consists of two lots containing a vacant motel (to be removed) and undeveloped, wooded land. The site is zoned for residential use, and its use would result in a negligible reduction in the available residential land within the Town of Barnstable. The applicant intends to provide an evergreen landscaped screen along the northern boundary (along Shootflying Hill Road) and a landscaped screen along the western boundary adjacent to existing homes (COP Volume I; Epsilon 2022). Phase 1 provides no screening along the transmission line ROW to the south or undeveloped, wooded lots to the east.

The land to the east is currently undeveloped, wooded, and owned by the Barnstable Chamber of Commerce. Lack of screening at the substation site may reduce value and discourage potential future development and use of the land for Chamber of Commerce purposes or for the residential development allowed by the zoning designation. Accordingly, BOEM would require that landscape screening be provided along the east and west substation boundaries to separate and buffer the adjoining properties from the substation use (EIS Appendix H).

The possible substation site adjacent to the West Barnstable Substation is separated from existing or potential residential development by the existing substation and Route 6. The Barnstable State Forest, 500 feet east, separates the site from other nearby residential areas.

The presence of the Phase 1 onshore transmission cable infrastructure would have no impacts on land use; the cable conduits would be underground and located within the existing ROW. With implementation of vegetative screening on the new substation property along the eastern and western boundaries (EIS Appendix H), the new and expanded substations would not discourage residential use or development. Subject to these mitigation and monitoring measures, Phase 1 impacts on land use would be long term and **negligible** to **minor**.

Upon completion of decommissioning, the Phase 1 WTGs would no longer be visible from coastlines, reversing the **negligible** impacts attributable to the views of WTGs. Onshore substations may be removed or continue in use as part of the regional electrical infrastructure.

**Traffic**: Use of ports for Phase 1 construction would add incrementally to the road traffic volume typically generated by ports that support industrial activity and commercial shipping. Construction may require oversized truck loads for movement of large components from supply sources to ports. Large truck movements, especially oversized loads, would produce temporary traffic delays and congestion.

The Phase 1 OECR would be installed in an underground duct bank within existing road or transmission line ROWs, resulting in construction work zones and possibly temporary lane closures along the roads listed in Table G.2.7-4. Prior to construction, the applicant would work with the Town of Barnstable to develop a TMP to be submitted for review and approval by appropriate municipal authorities (typically department of public works/town engineer and police) (COP Volume III; Epsilon 2022). In addition, BOEM is evaluating the following mitigation and monitoring measure to address impacts on land use and coastal infrastructure, as described in detail in Table H-2 of EIS Appendix H. The Final EIS will list the mitigation and monitoring measures that BOEM would require as a condition of COP approval:

- Restore and repave of all disturbed surfaces;
- Develop and implement of TMPs in coordination with county and municipal governments;
- Public outreach as established in the TMPs to notify residents and business owners of schedules, vehicular access, and traffic movement impacts of construction;
- Schedule construction to avoid tourist seasons for coastal and beach locations with a summer tourism season; and
- Use existing road and utility ROWs for cable routes.

Any unanticipated change in construction location, timing, or method would result in revision of the TMP before construction changes are implemented. The applicant would use various methods of public outreach to keep residents, business owners, officials, and other stakeholders updated on the schedules, vehicular access, and other details related to traffic movement during construction. Construction disturbances would last up to 1 year for OECR installation (excluding the June through August peak tourist season); however, the applicant would complete construction at any one location along a public road in a shorter time period (days or weeks).

Given the incremental addition to existing road traffic in the vicinity of ports and the applicant's commitment to develop a TMP in coordination with municipal authorities for OECR installation, construction-generated traffic and road disturbance would have localized, short-term, and **minor** impacts on land use and coastal infrastructure.

Road traffic during Phase 1 operations would be generated by worker commute trips and as-needed truck transportation of components or supplies to ports. Access roads to the planned operations base in Bridgeport, Connecticut, would be most affected by proposed Project-related traffic. Access roads to Vineyard Haven and New Bedford Harbor may also support a portion of the traffic from Phase 1. While road traffic estimates are not available, the applicant estimates that Phase 1 operations would generate approximately 250 vessel round trips annually (EIS Section 3.13, Navigation and Vessel Traffic). The road traffic generated by crew and supplies traveling to the ports for these marine trips would only incrementally increase the traffic generated by the existing ports and surrounding marine, industrial, and commercial land uses. Occasional repairs or maintenance along the OECR could briefly disrupt road traffic. The increase in or occasional disruption to road traffic during operations would have a long-term, localized, and **negligible** to **minor** impact on land use and coastal infrastructure.

Decommissioning would result in impacts on road traffic as traffic increases to the port facilities that provide support facilities, with short-term and **minor** impacts on land use and coastal infrastructure, similar to impacts during construction.

***Impacts of Phase 2***

The land use and coastal infrastructure impacts of Phase 2 construction, operations, and decommissioning (with or without the SCV) would be similar to those described for Phase 1 for IPFs related to accidental releases, lighting, noise, port utilization, and traffic. While Phase 2 would involve more WTGs and ESPs and a different OECR in Barnstable, the incremental differences in activity between Phase 2 and Phase 1, as well as the combined effect of Phase 1 and Phase 2 together would not change any of the impact magnitudes described for Phase 1 construction, except as discussed below.

If the applicant includes the SCV as part of the final proposed Project design, BOEM would provide a more detailed analysis of the SCV and the Phase 2 OECC impacts on land use and coastal infrastructure in a supplemental NEPA analysis. The SCV could be proposed either as an alternative to or in addition to the Phase 2 OECR through Barnstable County.

**Land disturbance:** For the Phase 2 OECR within Barnstable County, the potential landfall site at Dowses Beach would temporarily disrupt the paved beach parking area, while the potential landfall site at the end of Wianno Avenue would disrupt a road stub that may also be used for parking. Onshore installation and construction of the OECR would temporarily disturb neighboring land uses and reduce beach or waterfront parking and activities. The applicant's planned use of the West Barnstable Substation for interconnection would limit the need for additional land disturbance for substation construction; however, an expanded or additional substation site in Barnstable County may be needed. Overall, construction of Phase 2's Barnstable County landfall site and OECR would have localized, short-term, and **minor** impacts on land use and coastal infrastructure due to construction-related land disturbance.

Construction of the SCV would have short-term land disturbance impacts in Bristol County similar to those described for the Phase 1 and Phase 2 OECR in Barnstable County. Potential impacts would depend upon the landfall site, cable route, and substation locations. If the SCV is selected, a detailed impacts analysis would be provided in a subsequent filing.

During operations, the land disturbance impacts of the Phase 2 OECR within Barnstable County and Bristol County (if the SCV is selected) would be similar to those of Phase 1, with **negligible** impacts on land use and coastal infrastructure.

During decommissioning, removal of onshore cables would be accomplished without land disturbance or excavation.

**Presence of structures:** The Phase 2 WTGs (up to 88 WTGs) would be further from the coastline than Phase 1 WTGs. Phase 2 would have a long-term, continuous, and **negligible** impact on land use and coastal infrastructure in the geographic analysis area due to views of WTGs and the potential impacts on property use and value.

The Phase 2 OECR within Barnstable County would follow roads and transmission line ROWs and would not displace or change any existing land uses, resulting in **negligible** impacts on land use and coastal infrastructure. If a new substation is required within Barnstable County for Phase 2, the new substation could result in a **negligible** to **moderate** impact on neighboring land uses, depending on the location and design of the substation.

Upon completion of decommissioning, the impacts on land use and coastal infrastructure resulting from the Phase 2 WTGs would be reversed. Onshore substations may be removed or continue in use as part of the regional electrical infrastructure.

The SCV onshore cable route would follow roads and transmission line ROWs and require a new substation, with impacts on land use within Bristol County dependent upon substation location and screening. If the SCV is selected, a detailed impacts analysis would be provided in a subsequent filing.

***Cumulative Impacts***

The cumulative impacts of Alternative B considered the impacts of the proposed Project in combination with other ongoing and planned wind activities. Ongoing and planned non-offshore wind activities described in Table G.1-20 would contribute to impact on land use and coastal infrastructure through the primary IPFs of land disturbance and the presence of structures. It is unlikely that onshore cables or substations from other offshore wind projects would be located close enough and constructed during the same time period to generate an overlapping land disturbance impact.

If any such overlaps occur, the cumulative impacts on land use and coastal infrastructure would be **minor**, due to occasional disturbance along onshore cable routes and at substation sites. None of these cumulative impacts would affect overall land use patterns.

***Conclusions***

**Impacts of Alternative B.** Alternative B would have **minor** impacts and **minor** beneficial impacts on land use and coastal infrastructure within the geographic analysis area based on all IPFs. The impacts of Alternative B would not alter the overall character of land use and coastal infrastructure in the geographic analysis area. The most impactful IPFs would likely include land disturbance during cable installation, which could cause temporary traffic delays and public beach disturbance lasting a few days to weeks, and the utilization of ports, which would lead to a beneficial impact. IPFs would range from **negligible** to **moderate** (depending on the location of the Phase 2 substation site) and **minor** beneficial. This would include **minor** beneficial impacts resulting from port utilization; **minor** impacts resulting from land disturbance, noise, and traffic disruption during cable and substation installation; **minor** impacts resulting from the presence of the new substation; **minor** impacts resulting from traffic and noise in the vicinity of ports supporting construction; and **negligible** to **minor** impacts resulting from accidental releases. Phase 2 would have similar impacts, with a range of **minor** to **moderate** impacts resulting from land disturbance during construction. The SCV would require additional substations, with impacts that would depend on the location and design of these facilities.

**Cumulative Impacts of Alternative B.** The cumulative impacts on land use and coastal infrastructure in the geographic analysis area would be **minor** and **minor** beneficial**.** As with Alternative B alone, these cumulative impacts would not alter the overall character of land use and coastal infrastructure in the geographic analysis area. Cumulative impacts on land use and coastal infrastructure would be additive only if land disturbance associated with one or more other offshore wind project occurs in close spatial and temporal proximity. Individual IPFs would range from **negligible** to **moderate** adverse impacts and **negligible** to **minor** beneficial impacts. This includes the **minor** beneficial impacts of port utilization and **minor** adverse impacts of land disturbance, traffic, noise, and the presence of new substations. Phases 1 and 2 would contribute to the overall impact rating primarily through port-related traffic and noise and the onshore OECR and substation installation and operation, as well as beneficial impacts due to the use of port facilities designated for offshore wind activity.

#### Impacts of Alternative C – Habitat Impact Minimization Alternative on Land Use and Coastal Infrastructure

Alternatives C-1 and C-2 would not alter the impacts of Phase 1 or Phase 2 on land use and coastal infrastructure. The WTG and offshore cable routing alterations for Alternative B would not change the discussion and conclusions above regarding the IPFs relevant to land use and coastal infrastructure. Therefore, the impacts of Alternatives C-1 and C-2 would be the same as those of Alternative B.

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# Appendix H
# Mitigation and Monitoring

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## Table of Contents



## List of Tables

## Abbreviations and Acronyms

| | |
|---|---|
| AIS | automatic identification system |
| ASR | airport surveillance radar |
| BOEM | Bureau of Ocean Energy Management |
| BSEE | Bureau of Safety and Environmental Enforcement |
| CFR | Code of Federal Regulations |
| CMP | construction management plan |
| COP | construction and operations plan |
| CZM | Office of Coastal Zone Management |
| dB | decibel |
| dB re 1 μPa | decibels relative to 1 micropascal |
| DMA | dynamic management area |
| DTS | distributed temperature sensing |
| EIS | environmental impact statement |
| ESA | Endangered Species Act |
| ESP | electrical service platform |
| FAA | Federal Aviation Administration |
| HAPC | habitat area of particular concern |
| HDD | horizontal directional drilling |
| HH:MM | hour:minute |
| HRG | high-resolution geophysical |
| ID | identification |
| IHA | Incidental Harassment Authorization |
| ITA | Incidental Take Authorization |
| kHz | kilohertz |
| MassDEP | Massachusetts Department of Environmental Protection |
| NA | not applicable |
| NARW | North Atlantic right whale |
| NHESP | Natural Heritage and Endangered Species Program |
| NHPA | National Historic Preservation Act |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| OECC | offshore export cable corridor |
| PAM | passive acoustic monitoring |
| PATON | private aid to navigation |
| PPPP | Piping Plover Project Plan |
| PSO | protected species observer |
| ROD | Record of Decision |
| SAR | search and rescue |
| SMA | seasonal management area |
| SWDA | Southern Wind Development Area |
| TMP | traffic management plan |
| USACE | U.S. Army Corps of Engineers |
| USCG | U.S. Coast Guard |
| USFWS | U.S. Fish and Wildlife Service |
| UTC | Universal Time Coordinated |
| WTG | wind turbine generator |
| Y/N | yes/no |
| YY-MM-DDT | Year-Month-Day Time Zone |
| YYYY-MM-DD | Year-Month-Day |

# H Mitigation and Monitoring

As part of the proposed New England Wind Project (proposed Project), Park City Wind, LLC (applicant) has voluntarily committed to measures to avoid, reduce, otherwise mitigate, or monitor[1] impacts (mitigation and monitoring measures) on the resources discussed in Chapter 3, Affected Environment and Environmental Consequences, and Appendix G, Impact-Producing Factor Tables and Assessment of Resources with Minor (or Lower) Impacts, of the Draft Environmental Impact Statement (EIS). The mitigation and monitoring measures that the applicant has committed to implement are summarized in the Construction and Operations Plan (COP) (Volume III, Section 4; Epsilon 2022).

The Bureau of Ocean Energy Management (BOEM) considers as part of the Proposed Action only those mitigation and monitoring measures that the applicant has committed to in the COP. BOEM may select alternatives or require additional mitigation or monitoring measures as a condition of COP approval to further protect and monitor these resources. Additional potential mitigation and monitoring measures have been developed through reviews under several environmental statutes (National Historic Preservation Act [NHPA], Magnuson-Stevens Fisheries Conservation and Management Act, Endangered Species Act [ESA], and Marine Mammal Protection Act), as discussed in EIS Appendix A, Required Environmental Permits and Consultations. The mitigation and monitoring measures that the applicant has committed to implement (including and in addition to those defined in the COP) are listed in Table H-1. Mitigation and monitoring measures that may result from reviews under the statutes listed above are shown in Table H-2. Some of these mitigation and monitoring measures are outside of BOEM's statutory and regulatory authority but could potentially be adopted and imposed by other governmental entities. Tables H-1 and H-2 provide descriptions of mitigation or monitoring measures, along with the resource or resources to which each measure applies.

If the COP is approved or approved with conditions, it will include mitigation and monitoring measures developed under various consultations and permit reviews (e.g., ESA and Marine Mammal Protection Act) and adopted by the Final EIS Record of Decision (ROD). If BOEM decides to approve the COP, the ROD will state which of the additional mitigation and monitoring measures identified by BOEM in Tables H-1 and H-2 have been adopted; if measures are not adopted, the ROD will state why they were not. If the measures adopted differ substantially from those listed in Tables H-1 and H-2, BOEM will evaluate whether impacts analyses need to be modified to address those changes. The applicant will be required to implement the mitigation and monitoring measures applicable that are adopted in the ROD (Code of Federal Regulations, Title 40, Section 1505.3 [40 CFR § 1505.3]), and it will be required to certify compliance with certain terms and conditions as required under 30 CFR § 585.633(b).

Actions may be required to evaluate the effectiveness of a mitigation and monitoring measure or to identify if resources are responding as predicted to impacts from the proposed Project. The applicant may be required to develop additional monitoring programs in coordination with BOEM and agencies with jurisdiction over the resource to be monitored. The information generated by monitoring may be used to (1) adapt how a mitigation and monitoring measure identified in the COP or ROD is being implemented, (2) develop or modify future mitigation and monitoring measures for the decommissioning of the proposed Project or for all stages of future projects, and/or (3) contribute to regional efforts intended to gain a better understanding of the impacts and benefits resulting from offshore wind energy projects in the Atlantic. Unless specified, the proposed mitigation and monitoring measures described below would not

[1] According to the Council on Environmental Quality, monitoring is "fundamental for ensuring the implementation and effectiveness of mitigation commitments, meeting legal and permitting requirements, and identifying trends and possible means for improvement" (CEQ 2011).

change the impact ratings on the affected resource, as described in EIS Chapter 3 and Appendix G, but would reduce expected impacts or inform the development of addition mitigation and monitoring measures if required.

**Table H-1: Applicant-Proposed Mitigation Measures and Monitoring Efforts Analyzed**

| Measure Number | Measure Title | Measure Description | Resource Area Addressed (EIS Section) |
|---|---|---|---|
| 1. | Construction Management Plan | The applicant will prepare and implement a CMP that will be used by the applicant and its contractors during construction. The CMP will be an integral part of the applicant's effort to ensure that environmental protection and sound construction practices are implemented. | All resources |
| 2. | Dust control plans for onshore construction and laydown areas | The applicant will develop dust control plans for onshore construction areas to minimize impacts from fugitive dust resulting from construction activities. | Air Quality (G.2.1) |
| 3. | Use of low-sulfur fuels | Proposed Project engines and generators will use low-sulfur fuels and meet or emit less than the applicable on-road, non-road, and marine engine emission standards. | Air Quality (G.2.1) |
| 4. | Emissions control technology | Emissions from Outer Continental Shelf sources will meet applicable Massachusetts Best Available Control Technology and Lowest Achievable Emission Rate limits. | Air Quality (G.2.1) |
| 5. | Emissions offsets | The applicant will offset applicable nitrogen oxides and volatile organic compound emissions by acquiring emissions offsets or other means acceptable to the U.S. Environmental Protection Agency. | Air Quality (G.2.1) |
| 6. | Vehicle Fueling | The applicant will prohibit field refueling of vehicles within 100 feet of wetlands or waterways or known private or community potable wells or within any Town of Barnstable water supply Zone I area. | Water Quality (G.2.2) |
| 7. | Spill response | Proper spill containment gear and absorption materials will be maintained for immediate use in the event of any inadvertent spills or leaks. Any onshore substation equipment will be equipped with full containment for any components containing dielectric fluid. | Water Quality (G.2.2) |
| 8. | Tree-clearing restrictions | To be protective of maternity roosts with young bats that are unable to fly, the applicant will avoid clearing of trees (greater than 3 inches diameter at breast height) between June 1 and July 31, unless bat surveys are conducted pursuant to current USFWS protocols and no northern long-eared bats (*Myotis keenii*) are documented. | Bats (G.2.3) |
| 9. | Avian and bat post-construction monitoring program | The applicant will develop and implement a framework for an avian and bat post-construction monitoring program. The applicant expects to model the framework for the proposed Project on the framework developed for the Vineyard Wind 1 Project (Vineyard Wind 1); therefore, the framework for the proposed Project will include, at a minimum:<br>• Acoustic monitoring for birds and bats;<br>• Installation of Motus receivers on WTGs in the SWDA and support with upgrades or maintenance of two onshore Motus receivers;<br>• Deployment of up to 150 Motus tags per year for up to 3 years to track Roseate Terns (*Sterna dougallii*), Common Terns (*Sterna hirundo*), and/or nocturnal passerine migrants;<br>• Pre- and post-construction boat surveys;<br>• Avian behavior point count surveys at individual WTGs; and<br>• Annual monitoring reports that will be used to assess the need for reasonable revisions (based on subject matter expert analysis) to the monitoring plan and may include new technologies as they become available for use in offshore environments.<br>The applicant will work with BOEM to ensure the data is publicly available. | Bats (G.2.3); Birds (G.2.4) |
| 10. | Aircraft detection lighting system | The applicant has committed to use FAA-approved aircraft detection lighting system, which will only activate the FAA hazard lighting when an aircraft is in the vicinity of the wind facility to reduce the visibility of nighttime lighting and, thus, reduce nighttime visual impacts. | Bats (G.2.3); Birds (G.2.4); Cultural Resources (3.10); Recreation and Tourism (3.15); Scenic and Visual Resources (3.16) |
| 11. | Benthic monitoring framework | The applicant will develop a benthic monitoring framework in consultation with BOEM and other agencies as appropriate (COP Appendix III-U; Epsilon 2022), based on the framework prepared for Vineyard Wind 1. | Benthic Resources (3.4) |
| 12. | Sensitive habitat avoidance | Offshore export cable installation will avoid important habitats and those considered habitats areas of particular concern, such as eelgrass beds and hard-bottom sediments, if feasible. The applicant expects to avoid the identified eelgrass resources near Spindle Rock in proximity to the Phase 1 landfall sites, as well as isolated areas of hard bottom may be avoided, such as at Spindle Rock. | Benthic Resources (3.4); Coastal Habitats and Fauna (3.5); Finfish, Invertebrates, and Essential Fish Habitat (3.6) |
| 13. | Mid-line anchor buoys | Where feasible and considered safe, vessels deploying anchors will use mid-line anchor buoys to reduce the amount of anchor chain or line that touches the seafloor. | Benthic Resources (3.4); Coastal Habitats and Fauna (3.5); Finfish, Invertebrates, and Essential Fish Habitat (3.6) |
| 14. | Anti-perching | In accordance with safety and engineering requirements, the applicant will consider installing anti-perching devices on WTGs and ESP(s), where and if appropriate, to reduce potential bird perching locations. | Birds (G.2.4) |
| 15. | Bird mortality monitoring | Using a standardized protocol for the proposed Project, the applicant will document any dead or injured birds found on vessels and structures during construction, operations, and decommissioning. | Birds (G.2.4) |

| Measure Number | Measure Title | Measure Description | Resource Area Addressed (EIS Section) |
|---|---|---|---|
| 16. | Piping Plover Protection Plan | The applicant has developed a PPPP for the Phase 1 landfall sites and expects to develop a similar plan for the Phase 2 landfall sites (COP Appendix III-R; Epsilon 2022). The applicant expects that activities at the landfall sites will not occur between April 1 and August 31 to avoid and minimize noise impacts on Piping Plover during the breeding season. | Birds (G.2.4) |
| 17. | Piping Plover Protection Plan, HDD Provisions | Prior to HDD operations, construction personnel will be provided with the PPPP to achieve proper implementation. The PPPP includes (at minimum) the following provisions:<br>• Installation of export cable conduits is not expected to be initiated between April 1 and August 31. If HDD activities are initiated between April 1 and August 31, or if work is re-initiated after a 48-hour work stoppage during the Piping Plover nesting season (the aforementioned time period), the Massachusetts NHESP, the USFWS, and BOEM must be notified with the reason, anticipated duration of the work, and any additional information requested by NHESP, the USFWS, and BOEM.<br>• In the unlikely event that disturbance associated with HDD activities to coastal beach occurs, a qualified biologist will survey the site in advance of any equipment access to the beach and ensure no remedial actions will interfere with nesting Piping Plovers or other state-listed species. | Birds (G.2.4) |
| 18. | Piping Plover Protection Plan (pre-construction monitoring) | If HDD activities are initiated between April 1 and August 31, or if work is re-initiated after a 48-hour work stoppage during the Piping Plover nesting season (the aforementioned time period), the applicant will follow the mitigation and monitoring measures outlined in the PPPP. As depicted in the PPPP, a qualified biologist will perform surveys to determine the presence/absence of any nesting Piping Plovers within 200 yards of the work zone.<br>If no nests, scrapes, or territorial pairs are identified within 200 yards of the work zone, the shorebird monitor will document the findings, report to NHESP and the applicant, and the applicant will be cleared to mobilize into the area within 48 hours, with no further monitoring activities required.<br>If nests, scrapes, or territorial pairs are observed within 200 yards of the work zone, locations will be recorded and the following monitoring will be required, based on nests and/or chick proximity to the work zone:<br>• Greater than or equal to 100 yards from work zone and nest monitored once per day at dawn (before 0600 hours) during appropriate weather conditions;<br>• 50 to 100 yards from work zone and nest monitored twice per day at dawn and dusk (before 0600 hours and after 1900 hours) during appropriate weather conditions; and<br>• Less than 50 yards to the work zone and no equipment may be mobilized to the OECC landing sites unless specifically permitted by the NHESP. | Birds (G.2.4) |
| 19. | Sensitive habitat map distribution | Prior to the start of construction, the applicant will provide contractors with a map of sensitive habitats to allow them to plan their mooring positions accordingly. Vessel anchors and legs will be required to avoid known eelgrass beds and other sensitive seafloor habitats (hard/complex bottom), as long as such avoidance does not compromise the vessel’s safety or the cable’s installation. Where it is considered impossible or impracticable to avoid a sensitive seafloor habitat when anchoring, use of mid-line anchor buoys will be considered, where feasible and considered safe, as a potential measure to reduce and minimize potential impacts from anchor line sweep. | Coastal Habitats and Fauna (3.5) |
| 20. | Oil spill response plan | The applicant will develop an oil spill response plan (COP Appendix I-F; Epsilon 2022). | Coastal Habitats and Fauna (3.5); Water Quality (G.2.2) |
| 21. | Construction lighting reduction | During construction and operations, the applicant will reduce lighting to the extent practicable and down-shield lighting or use down-lighting. | Coastal Habitats and Fauna (3.5); Bats (G.2.3); Birds (G.2.4) |
| 22. | Pre-construction, construction, and post-construction fisheries surveys | The applicant is collecting pre-construction fisheries data in cooperation with University of Massachusetts Dartmouth School of Marine Science and Technology via trawl and drop camera surveys within the SWDA and OECC.<br>The applicant will develop a framework for construction and post-construction fisheries studies within the SWDA and OECC, in coordination with other offshore wind energy developers in the Rhode Island and Massachusetts Lease Areas. All pre-construction, construction, and post-construction survey and monitoring work will be publicly available. The applicant will work with the Responsible Offshore Science Alliance and the Regional Wildlife Science Entity to help streamline and standardize available data across all offshore efforts. | Finfish, Invertebrates, and Essential Fish Habitat (3.6) |
| 23. | Pile driving soft start | The applicant will apply a soft-start procedure to the pile-driving process, in which the pile-driving process includes an initial set of three strikes from the impact hammer at reduced energy, followed by a 1-minute waiting period. This process will be repeated a total of three times prior to initiation of pile driving. Soft start will occur for all impact driving, including at the beginning of the day, and at any time following a cessation of impact pile driving of 30 minutes or longer. | Finfish, Invertebrates, and Essential Fish Habitat (3.6), Marine Mammals (3.7), Sea Turtles (3.8) |
| 24. | Offshore Wind Protected Marine Species Mitigation Fund | The applicant will establish an Offshore Wind Protected Marine Species Mitigation Fund as part of Phase 1. The applicant has committed to provide up to $2.5 million to the Mystic Aquarium in Connecticut to continue evolving the understanding of underwater noise generated by offshore wind farms and the potential impacts on cetacean and pinniped behavior, hearing, and physiology. In addition, this fund will further the investigation of best practices and advance technologies to reduce potential sound impacts and collision threats from offshore wind project development. | Finfish, Invertebrates, and Essential Fish Habitat (3.6), Marine Mammals (3.7), Sea Turtles (3.8) |
| 25. | Pile-driving time-of-year restriction | No pile-driving activities will occur from January 1 to April 30. | Finfish, Invertebrates, and Essential Fish Habitat (3.6), Marine Mammals (3.7), Sea Turtles (3.8) |
| 26. | Pile-driving noise attenuation | The applicant will implement noise attenuation mitigation to reduce sound levels by a target of approximately 12 decibels or greater. Sound source verification monitoring, such as with PAM devices, will be used to verify the level of noise attenuation achieved by noise abatement methods. | Finfish, Invertebrates, and Essential Fish Habitat (3.6), Marine Mammals (3.7), Sea Turtles (3.8) |

| Measure Number | Measure Title | Measure Description | Resource Area Addressed (EIS Section) |
|---|---|---|---|
| 27. | Work zones | The applicant will use expanded work zones and construction staging areas where required to accommodate special construction equipment and materials. Wherever possible, these spaces will be located within previously developed areas, such as nearby parking lots, to avoid or minimize disturbance to naturally vegetated areas. Any previously undisturbed areas of wildlife habitat affected by expanded work zones or elsewhere along the onshore export cable routes and grid interconnection routes will be restored in consultation with local officials. For construction within utility right-of-way, any disturbed vegetated areas will be loamed and seeded to match pre-existing vegetation. | Terrestrial Habitats and Fauna (G.2.5); Land Use and Coastal Infrastructure (G.2.7) |
| 28. | Offshore markings and coordination | To minimize hazards to navigation, all proposed Project-related vessels and equipment will display the required marine navigation lighting and day shapes.<br>The applicant will issue Offshore Wind Mariner Update Bulletins and coordinate with the USCG to provide Notices to Mariners to notify recreational and commercial vessels of their intended operations within the offshore development area.<br>The applicant is currently providing and will continue to provide portable digital media with electronic charts depicting locations of proposed Project-related activities. | Commercial Fisheries and For-Hire Recreational Fishing (3.9); Navigation and Vessel Traffic (3.13); Recreation and Tourism (3.15) |
| 29. | Aids to navigation | Each proposed Project WTG and ESP will be maintained as a PATON in accordance with USCG's PATON marking guidance for offshore wind facilities.<br>The applicant will implement a uniform system of marine navigation lighting and marking for the offshore facilities, which is currently expected to include yellow flashing lights on every WTG foundation and ESP; unique alphanumeric identifiers on the WTGs, ESPs, and/or their foundations; and high-visibility yellow paint on each foundation.<br>Mariner radio activated sound system and AIS transponders are included in the offshore facilities' design to enhance marine navigation safety. Each WTG and ESP will also be clearly identified on navigation charts. | Commercial Fisheries and For-Hire Recreational Fishing (3.9); Navigation and Vessel Traffic (3.13); Recreation and Tourism (3.15) |
| 30. | Marine coordination | The applicant will employ a Marine Operations Liaison Officer, who will be responsible for safe marine operations. The applicant will also employ a Marine Coordinator during proposed Project construction to coordinate with maritime partners and stakeholders (e.g., the USCG, U.S. Navy, port authorities, state and local law enforcement, marine patrol, commercial operators, etc.). | Commercial Fisheries and For-Hire Recreational Fishing (3.9); Navigation and Vessel Traffic (3.13); Recreation and Tourism (3.15) |
| 31. | Funding for fisheries research and education | As part of Phase 1, The applicant has committed to provide up to $2.5 million to support fisheries research and education as part of a new initiative launched by the University of Connecticut to improve the understanding of potential environmental impacts from offshore wind.<br>Additionally, as part of Phase 1, The applicant will allocate up to $7.5 million in funds to support environmental initiatives, assist Connecticut fishermen, and further bolster local communities in Connecticut where offshore wind development activities are taking place. | Commercial Fisheries and For-Hire Recreational Fishing (3.9); Demographics, Employment, and Economics (3.11); Environmental Justice (3.12) |
| 32. | Avoid identified shipwrecks, debris fields, and submerged landform features that can be avoided | The applicant is required to avoid the shipwrecks, potentially significant debris fields, and as many as possible of the submerged, landform features identified during marine archaeological surveys of the SWDA and OECC. While avoidance of shipwrecks and debris fields is typically simple, avoidance of all submerged landform features is typically not possible due to their size and orientation. | Cultural Resources (3.10) |
| 33. | Gay Head Lighthouse repair funds | The applicant will contribute up to $150,000 each for Phase 1 and Phase 2 to fund ongoing maintenance and repair work at the Gay Head Lighthouse. Such work may include, but is not limited to, the repair of exterior metalwork including the lantern curtain wall, kick plate, cast iron sills, railings, stanchions, stiles, and other metalwork. Additionally, such work may include repair and repointing of the structure to secure the envelope and reduce potential water infiltration. | Cultural Resources (3.10) |
| 34. | Vineyard Sound and Moshup's Bridge traditional cultural property mitigation fund | Pursuant to consultations between the applicant and the Wampanoag Tribe of Gay Head (Aquinnah), the applicant will contribute up to $150,000 each for Phase 1 and Phase 2 to support public education purposes on Moshup and Moshup's Bridge. The applicant will consult with the tribe to determine the most appropriate use of the funds and the scope of work. | Cultural Resources (3.10) |
| 35. | Apply no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey Paint Color to the turbines | The applicant is required to paint the WTGs off-white/light grey (no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey) to reduce visual impacts during daylight hours on historic properties. The applicant has already committed to this measure as part of the NHPA Section 106 process. | Cultural Resources (3.10); Recreation and Tourism (3.15); Visual Resources (3.16) |
| 36. | Fisheries communication plan | Prior to the start of offshore export cable-laying preparatory activities for either phase, the applicant will communicate with commercial fishermen following the protocols outlined in the fisheries communication plan provided in the COP (Appendix III-E; Epsilon 2022) to help avoid potential fishing gear interactions. | Commercial Fisheries and For-Hire Recreational Fishing (3.9); Demographics, Employment, and Economics (3.11) |
| 37. | Direct support for economic and community initiatives | During Phase 1, the applicant has committed $26.5 million (nominal) to support the economic and community initiatives such as supply chain integration, workforce development, and offshore wind-related marine and fisheries research, as well as the local communities in Connecticut. The applicant also expects to develop additional community and environmental initiatives in connection with its efforts to secure long-term contracts/power purchase agreements for the electricity generated by Phase 2. | Demographics, Employment, and Economics (3.11); Environmental Justice (3.12) |
| 38. | TMP | Prior to construction, the applicant will work with the Town of Barnstable to develop a TMP for the onshore construction of each proposed Project phase. The TMP will be a living document such that any unanticipated change in construction location, timing, or method previously identified will result in revision of the TMP and approval by the appropriate authorities before any construction changes are implemented.<br>The applicant will restore paved areas at landfall sites and repave roads in accordance with Massachusetts Department of Transportation and Town specifications to as-new conditions and restore disturbed vegetated areas to match pre-existing vegetation. | Demographics, Employment, and Economics (3.11); Land Use and Coastal Infrastructure (G.2.7) |

| Measure Number | Measure Title | Measure Description | Resource Area Addressed (EIS Section) |
|---|---|---|---|
| 39. | Onshore construction public outreach | The applicant will use various methods of public outreach prior to and during construction to keep residents, business owners, and officials updated on the construction schedules, vehicular access, lane closures, detours, other traffic management information, local parking availability, emergency vehicle access, construction crew movement and parking, laydown areas, staging, equipment delivery, nighttime or weekend construction, and road repaving. | Demographics, Employment, and Economics (3.11); Land Use and Coastal Infrastructure (G.2.7) |
| 40. | Onshore cable installation restrictions | The applicant will generally limit installation of onshore duct bank and cables, and construction is anticipated to occur during typical work hours (7:00 a.m. to 6:00 p.m.) Monday through Friday. For some specific instances at some locations, or at the request of the Barnstable Department of Public Works, the applicant may seek municipal approval to work at night or on weekends. Nighttime work will be minimized and performed only on an as-needed basis, such as when crossing a busy road, and will be coordinated with the Town of Barnstable.<br>The applicant will avoid construction activities at the landfall sites and along the onshore export cable route and grid interconnection routes (particularly where the routes follow public roadway layouts) will also likely be subject to significant construction limitations from Memorial Day through Labor Day unless authorized by Barnstable but could extend through June 15 subject to consent from the Department of Public Works. The applicant will consult with the Town of Barnstable regarding the construction schedule. | Land Use and Coastal Infrastructure (G.2.7); Recreation and Tourism (3.15) |
| 41. | Visual screening of substation sites | For the Phase 1 onshore substation, the applicant will plant a vegetated screen on the western and northern boundaries of the onshore substation site; the vegetated screening along the western edge will provide visual screening for existing residences.<br>For Phase 2, depending on the onshore substation site(s) selected, the applicant may plant vegetated screening to provide visual screening for existing residences. | Land Use and Coastal Infrastructure (G.2.7); Scenic and Visual Resources (3.16) |
| 42. | WTG shutdown mechanism | All WTG rotors (blade assemblies) will have control mechanisms operable from the applicant control centers available 24 hours per day, 7 days per week. The control mechanisms will enable control room operators to shut down the requested WTGs within an agreed upon time of notification between the USCG and the applicant. A formal shutdown procedure will be part of the standard operating procedures and periodically tested. Normally, USCG-ordered shutdowns will 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. | Navigation and Vessel Traffic (3.13) |

AIS = automatic identification system; BOEM = Bureau of Ocean Energy Management; CMP = construction management plan; COP = Construction and Operations Plan; EIS = environmental impact statement; ESP = electrical service platform; FAA = Federal Aviation Administration; HDD = horizontal directional drilling; NHESP = Natural Heritage and Endangered Species Program; NHPA = National Historic Preservation Act; OECC = offshore export cable corridor; PAM = passive acoustic monitoring; PATON = private aid to navigation; PPPP = Piping Plover Project Plan; SWDA = Southern Wind Development Area; TMP = traffic management plan; USCG = U.S. Coast Guard; USFWS = U.S. Fish and Wildlife Service; WTG = wind turbine generator.

**Table H-2: Other Potential Mitigation Measures and Monitoring Efforts Analyzed**

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
|---|---|---|---|---|---|
| 1. | Construction | Tree-clearing limitations | The applicant will not clear trees (greater than 3-inch-diameter at breast height) from April 1 to October 31. Should presence/probable absence surveys be conducted pursuant to current USFWS protocols and no northern long-eared bats are documented, this measure may not be necessary for ESA compliance relative to the species. | Bats (G.2.3) | BOEM<br>BSEE |
| 2. | Operations | Acoustic bat detectors | The applicant will deploy acoustic bat detectors on a subset of WTGs or ESPs to refine the understanding of bat use of the Outer Continental Shelf and SWDA. Deployment configuration and number of detectors will be determined in consultation with applicable stakeholders. | Bats (G.2.3) | BOEM<br>BSEE |
| 3. | Construction, Operations, Decommissioning | Optical surveys of benthic invertebrates and habitat | The applicant will conduct optical surveys. Stations will be placed on a 0.9-mile (1.5-kilometer) grid, with four samples taken at each station twice per year. The drop camera surveys emulate the drop camera survey conducted in the lease area in 2012 and 2013 to support a before-after control impact study design (SMAST 2019). The survey methodology may be adapted over time based on the results obtained and feedback from various stakeholders. The applicant will consult with NMFS and BOEM prior to conducting surveys and address any agency comments in the survey plan. | Benthic Resources (3.4) | NMFS |
| 4. | Operations | Monitoring and minimizing foundation scour protection | The applicant will conduct post-construction monitoring to document habitat disturbance and recovery at offshore wind turbine foundations per the benthic habitat monitoring plan. Additionally, the applicant will inspect scour protection performance at 20% of locations every 3 years starting in Year 3. The applicant will consult with NMFS and BOEM prior to conducting inspections and address any agency comments prior to implementation. As appropriate, based on proposed Project design and engineering, the applicant will apply foundation scour protection to only the minimum area needed for sufficient protection. | Benthic Resources (3.4) | NMFS |
| 5. | Construction, Operations, Decommissioning | Plankton surveys | The applicant will conduct plankton surveys to estimate the relative abundance and distribution of planktonic species such as larval lobster using a towed neuston net to allow for comparison with 2019 baseline sampling (SMAST 2020). Plankton tows will be conducted at each survey location concurrently with the ventless trap surveys (i.e., two times per month from May 15 to October 31). The survey methodology may be adapted over time based on the results obtained and feedback from various stakeholders. | Benthic Resources (3.4) | NMFS |
| 6. | Operations | Post-construction bird monitoring | The applicant will finalize a post-construction bird monitoring plan prior to the start of operations, including (at minimum) the following components:<br>• Within the first year of operations, the applicant will install digital very high frequency telemetry automated receiving stations and acoustic monitoring devices to estimate the exposure of threatened and endangered species and other migratory birds to the operating wind facility.<br>• The applicant will install acoustic detectors for birds and provide periodic monitoring progress reports plus comprehensive annual reports, followed by a discussion of each year's results with BOEM and BSEE (and USFWS by request), including the potential need for reasonable revisions to the monitoring plan. All data generated as part of pre- and post-construction monitoring will be made available to the public through BOEM's website. | Birds (G.2.4) | BOEM<br>BSEE |
| 7. | Construction, Operations, Decommissioning | Bird and bat mortality reporting | The applicant must submit an annual report covering each calendar year, due by January 31 of the following year, documenting any dead (or injured) birds or bats found on vessels and structures during construction, operations, and decommissioning. The report must be submitted to BOEM (at renewable_reporting@boem.gov) and BSEE (at OSWSubmittals@bsee.gov) and USFWS. The report must contain the following information: the name of species, date found, location, a picture to confirm species identity (if possible), and any other relevant information. Carcasses with federal or research bands must be reported to the U,S, Geological Survey Bird Band Laboratory (https://www.usgs.gov/labs/bird-banding-laboratory). Any occurrence of dead ESA birds or bats must be reported to BOEM, BSEE, and USFWS as soon as practicable (taking into account crew and vessel safety), but no later than 24 hours after the sighting. If practicable, carefully collect the dead specimen and preserve the material in the best possible state. | Birds (G.2.4) | BOEM<br>BSEE |
| 8. | Operations | Bird deterrent devices | The applicant will install bird deterrent devices to minimize bird attraction to operating WTGs and ESPs. The location of bird-deterrent devices must be proposed by the applicant based on best management practices applicable to the appropriate operation and safe installation of the devices. The applicant must confirm the locations of bird-deterrent devices with a monitoring plan to track the efficacy of the deterrents as part of the as-built documentation it must submit with the facility design report for the proposed Project. | Birds (G.2.4) | USFWS<br>BSEE |
| 9. | Construction, Operations, Decommissioning | Offshore lighting restrictions | The applicant will use minimal lighting intensity necessary on vessels, WTGs, and ESPs to permit safe construction, operations, and decommissioning activities while reducing potential attraction of birds and sea turtles to proposed Project vessels and components.<br>Conditional on USCG approval, to minimize the potential of attracting migratory birds, the top of each light will be shielded to prevent upward illumination. | Birds (G.2.4); Sea Turtles (3.8) | USFWS<br>USCG |
| 10. | Construction | Dredging and cable installation methods and timing | The applicant will conduct dredging and cable installation activities using the least environmentally harmful method effective in each area, as well as updated habitat information (Table H-2, Measure #14) to avoid/minimize impacts on benthic habitat to the maximum extent practicable. Avoid perpendicular crossings of sand wave features where feasible and safe. Require all vessels deploying anchors to use, whenever feasible and safe, mid-line anchor buoys to reduce the amount of anchor chain or line that touches the seafloor. Require nearshore cable-laying activities to avoid high concentrations of fishing activities and natural resource events (spawning and egg laying). The non-HDD cable-laying activities in the northern part of the offshore export cable area within Nantucket Sound waters will occur outside of April to June. Should cable laying be required in the northern part of the export cable route within Nantucket Sound in April to June due to environmental or technical reasons, the applicant must provide justification to BOEM, MassDEP, Massachusetts Division of Marine Fisheries, and NMFS. | Coastal Habitats and Fauna (3.5) | MassDEP 401 Water Quality Certification<br>NMFS Essential Fish Habitat |
| 11. | Construction, Operations, Decommissioning | Anchoring plan | The applicant will implement an anchoring plan for all areas where anchoring is being used to avoid construction impacts on sensitive habitats, including hard-bottom and structurally complex habitats. The applicant will consider any new data on benthic habitats (Table H-2, Measure #14) to avoid/minimize impacts on benthic habitat to the maximum extent practicable. The anchoring plan must include the planned location of anchoring activities, sensitive habitats and locations, seabed features, potential hazards, and any related facility installation activities such as cables, WTGs, and ESPs, as appropriate. The applicant will require all vessels deploying anchors to use, whenever feasible and safe, mid-line anchor buoys to reduce the amount of anchor chain or line that touches the seafloor. The anchoring plan must be provided for BOEM and NOAA review and comment before construction begins. | Coastal Habitats and Fauna (3.5) | BOEM<br>BSEE |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
|---|---|---|---|---|---|
| 12. | Construction | Benthic monitoring plan | The applicant will consider any new data on benthic habitats when refining the plan. The applicant will be required to consult with NMFS and the MassDEP and the Massachusetts Division of Marine Fisheries and address any agency comments before finalizing and implementing the monitoring plan. If recovery is not observed within 5 years, the applicant, BOEM, and NMFS will confer regarding potential additional monitoring. The monitoring plan must evaluate if the cable protection (including different types of cable projection) used is mitigating impacts on juvenile cod HAPC.<br>In addition, for the portion of the proposed work in Town of Nantucket waters, (1) the applicant must obtain the approval of MassDEP for the final benthic monitoring plan, (2) the applicant must provide an annual report to the Nantucket Conservation Commission demonstrating the condition of the area in and around the cable installation to clearly demonstrate any impacts, and (3) if a report shows an impact, the applicant must provide a detailed mitigation or restoration plan to the conservation commission. In addition, the applicant must provide an annual report to MassDEP, the Massachusetts Division of Marine Fisheries, NMFS, and BOEM discussing the type(s) and scale(s) of any impacts identified. | Coastal Habitats and Fauna (3.5) | MassDEP 401 Water Quality Certification<br>BOEM<br>BSEE<br>Nantucket Conservation Commission. |
| 13. | Construction | Final cable protection in hard bottom | The applicant will install cable protection measures within complex hard-bottom habitat as defined in the COP, Essential Fish Habitat Assessment (BOEM 2019, 2020), and additional data from Measure #14 will consist of natural or engineered stone that does not inhibit epibenthic growth and provides three-dimensional complexity, both in height and in interstitial spaces. The applicant will consider nature-inclusive designs for optimized cable protection (Hermans et al. 2020). Additionally, per the Nantucket Order of Conditions (Nantucket Conservation Commission 2019), cable protection, where required in Town of Nantucket waters, must consist of natural materials that mimic the surrounding seafloor. The applicant will consult with NMFS and BOEM prior to the implementation of hard-bottom cable protection measures. BOEM will make recommendations regarding the final selection of engineered stone in consultation with NMFS. The effectiveness of natural and engineered stone as a mitigation measure to minimize impacts on juvenile cod HAPC will be evaluated/monitored as a component of a finalized benthic monitoring plan (Table H-2, Measure #12). | Coastal Habitats and Fauna (3.5) | Massachusetts CZM<br>BOEM<br>BSEE |
| 14. | Construction | Evaluation of additional benthic habitat data prior to cable laying | At a minimum, the applicant will process 75 benthic grabs over the entire length of the OECC (with approximately 42 in the eastern Muskeget section) and 60 underwater video transects over the entire length of the OECC (with 28 transects in the eastern Muskeget section). This information will be used to update habitat maps to resolve and delineate seafloor habitats consistent with NOAA's May 2020 Recommendations for Mapping Fish Habitat (NOAA 2020). Based on this review, the applicant will use the additional data to avoid eelgrass and hard-bottom/structurally complex habitats (including juvenile cod HAPC) to the maximum extent practicable while also maintaining a feasible route. | Coastal Habitats and Fauna (3.5) | BOEM<br>BSEE |
| 15. | Construction | Dredge disposal sites | Where dredging is necessary, the applicant will clearly identify a limited number of dredge disposal sites within known sand wave areas, and to the maximum extent practicable, ensuring that these sites do not contain resources that will be damaged by sediment deposition. To do this, the applicant will use the additional habitat data collected under Measure #13. In addition, the applicant will report the locations of dredge disposal sites to BOEM, NOAA, MassDEP, and Massachusetts CZM within 30 days of disposal of materials. These locations must be reported in latitude and longitude degrees to the nearest 10 thousandth of a decimal degree (roughly the nearest meter) or as precise as practicable. | Coastal Habitats and Fauna (3.5) | USACE<br>MassDEP<br>Massachusetts CZM |
| 16. | Construction | Bottom profiling | Prior to cable installation in Town of Nantucket waters, the applicant will provide updated bottom profiling detailing pre-construction bottom composition, sediment profiles, species composition, and topography of the area to be disturbed during cable installation and include at a minimum high-resolution video monitoring. | Coastal Habitats and Fauna (3.5) | Nantucket Conservation Commission |
| 17. | Construction, Operations, Decommissioning | PAM | The applicant will develop mitigation and monitoring measures similar to those in the Vineyard Wind 1 COP (Appendix III-M Table 31).<br>The applicant will use PAM buoys or autonomous PAM devices to record ambient noise and marine mammal species vocalizations in the lease area (before, during, and after construction [at least 2 years of operation]) to monitor impacts including vessel noise, pile driving, WTG operation, and large whale detections in the SWDA. Results must be provided within 90 days of buoy collection and again within 90 days of the 1-year and 2-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 for the U.S. Mid- and South Atlantic Outer Continental Shelf (UNH Undated). At least two buoys must be independently deployed within the lease area, or one or more buoys must be deployed in coordination with other acoustic monitoring efforts in the Rhode Island and Massachusetts Lease Areas. | Marine Mammals (3.7) | BOEM<br>BSEE |
| 18. | Construction | Pile-driving monitoring plan and PSO requirements | The applicant will submit a pile-driving monitoring plan to BOEM and NMFS for review and approval a minimum of 90 days prior to the commencement of pile-driving activities. The plan must:<br>• Contain information on the visual and PAM components of the monitoring plan;<br>• Confirm that the full extent of the harassment distances from piles (as defined in other mitigation and monitoring measures) are monitored for marine mammals to ensure that all potential take is documented;<br>• Include number of PSOs and/or Native American monitors that will be used, the platforms and/or vessels upon which they will be deployed, and contact information for the PSO provider(s); and<br>• Include measures for enhanced monitoring capabilities in the event that poor visibility conditions unexpectedly arise, and pile driving cannot be stopped.<br>The plan may also include deploying additional observers, using night vision goggles, or using PAM with the goal of ensuring the ability to maintain all exclusion zones in the event of unexpected poor visibility conditions. A communication plan detailing the chain of command, mode of communication, and decision authority must be described. PSOs must be previously approved by NMFS to conduct mitigation and monitoring duties for pile-driving activity. An adequate number of PSOs must be used to adequately monitor the area of the exclusion zone. The size of the exclusion zone may vary with specific time-of-year requirements for NARWs (*Eubalaena glacialis*) and should be described in the plan. | Marine Mammals (3.7) | NMFS<br>NHPA |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
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| 19. | Construction | Protocol when marine mammals are sighted during pre-pile-driving exclusion zones | If a marine mammal is observed entering or within the relevant exclusion zones prior to the initiation of pile-driving activity, pile-driving activity must be delayed (unless activities must proceed due to human safety considerations) until:<br>• The animal is verified to have voluntarily left and heading away from the exclusion area; or<br>• 30 minutes have elapsed without re-detection (for mysticetes, sperm whales [*Physeter macrocephalus*], Risso's dolphins [*Grampus griseus*], and pilot whales); or<br>• 15 minutes have elapsed without re-detection of other marine mammals. | Marine Mammals (3.7) | BOEM,<br>NOAA<br>BSEE |
| 20. | Construction | Enhanced time-of-year pile-driving shutdown and restart procedures for NARWs (May 1 to May 14 and November 1 to December 31) | If a NARW is observed or otherwise detected within the exclusion zone, pile-driving activities must stop (unless activities must proceed for human safety or installation feasibility concerns) and may not resume until:<br>• The following day, or until a follow-up aerial or vessel-based survey is able to confirm all NARW(s) have departed the 6.2-mile extended exclusion zone, as determined by the lead PSO after 1 full day of monitoring to confirm NARW(s) have left the 6.21-mile exclusion zone (May 1 to 14);<br>• Confirmation that all NARW(s) have left the 6.21-mile exclusion zone (November 1 to December 31); or<br>• Confirmation that all of NARW(s) have left the 0.62-mile exclusion zone after 60 minutes of monitoring (May 15 to October 31). | Marine Mammals (3.7) | BOEM,<br>NOAA<br>BSEE |
| 21. | Construction | Exclusion zones (no-go zones) for marine mammals | The applicant will reduce impact on marine mammals through the use of continuous PAM, visual monitoring by PSOs, or Native American monitors during pile-driving activities following standard protocols and data collection requirements specified by BOEM. PSOs will establish the following exclusion zones for NARWs 60 minutes prior to pile-driving activities through 30 minutes post-completion of pile-driving activity:<br>• At all times of year that pile driving takes place, for purposes of monitoring the exclusion zone, any large whale sighted by a PSO within 3,281 feet (1,000 meters [a NARW exclusion zone]) that cannot be identified to species must be treated as if it were a NARW. Additionally, a NARW observation at any distance from the pile must be treated as an observation within the exclusion zone and trigger any required delays or shutdowns in pile installation.<br>• From November 1 to December 31 and May 1 to May 14, the applicant must establish a 6.2-mile (10-kilometer) exclusion zone for NARWs (the applicant has the option to use aerial or vessel-based surveys from May 1 to May 14).<br>• For any piles driven May 15 to May 31, the exclusion zone must be extended from 3,281 feet (1,000 meters) to 6,562 feet (2,000 meters) for monopiles and 5,249 feet (1,600 meters) for jacket (i.e., half distance to Level B threshold) to minimize the extent of any take of NARWs.<br>• For any pile driving June 1 to October 31, the applicant must establish a 5,249-foot (1,000-meter) clearance zone for NARW with the exception as follows. Where the predicted Level B harassment zone will overlap with a DMA or Right Whale Slow Zone, the exclusion zone must be extended from 3,281 feet to 6,562 feet (1,000 to 2,000 meters) for monopiles and 5,249 feet (1,600 meters) for jacket piles (i.e., half distance to Level B threshold) to minimize the extent of any take of NARWs.<br>For all pile-driving activity, the applicant must designate clearance zones with radial distances as follows:<br>• All other mysticete whales (including humpback [*Megaptera novaeangliae*], fin [*Balaenoptera physalus*], sei [*Balaenoptera borealis*], and minke [*Balaenoptera acutorostrata*] whale): 1,649-foot (500-meter) exclusion zone at all times;<br>• Harbor porpoise [*Phocoena phocoena*]: 394-foot (120-meter) exclusion zone at all times; and<br>• All other marine mammals not listed above (including dolphin and pinnipeds): 164-foot (50-meter) exclusion zone at all times.<br>Monitoring for marine mammals must occur over the entire Level B distance for all marine mammals to document impacts and any potential take. | Marine Mammals (3.7) | BOEM,<br>NMFS<br>NOAA<br>BSEE |
| 22. | Construction | NARW PAM monitoring | The applicant will prepare and submit a PAM plan describing all equipment, procedures, and protocols to BOEM and NMFS at least 90 days prior to initiation of pile-driving activities. The PAM system must be designed such that detection capability extends to 6.21 miles (10 kilometers) from the pile-driving location. If the PAM operator has at least 75% confidence that a vocalization originated from a NARW within 6.21 miles (10 kilometers) of the pile-driving location, the PAM operator must determine that a NARW has been detected.<br>The applicant must continue to deploy the PAM system that is in place for May 1 to May 14 through May 31 and implement an extended PAM monitoring zone of 6.21 miles (10 kilometers) around any pile to be driven with all detections of NARWs provided to the visual PSO to increase situational awareness and to be considered as pile driving is planned.<br>At all times of year that pile driving takes place, any PAM detection of a NARW within the clearance/exclusion zone (see Measure #21) surrounding a pile must be treated the same as a visual observation and trigger any required delays in pile installation.<br>Between June 1 and October 31, if a DMA or Right Whale Slow Zone is designated that overlaps with a predicted Level B harassment zone (monopile foundation: 13,520 feet [4.1 kilometers], jacket foundation: 10,564 feet [3.2 kilometers]) from a pile to be installed, the PAM system in place during this period must be extended to the largest practicable detection zone to increase situational awareness of the visual PSOs and for purposes of planning pile installation. At all times of year any visual or PAM detection in the seasonal exclusion zones must be treated the same as a visual observation and trigger any required delays or shutdowns in pile installation. | Marine Mammals (3.7) | BOEM,<br>NMFS<br>NOAA<br>BSEE |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
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| 23. | Construction | Protocols for shutdown and power-down when marine mammals are sighted during pile driving | If a marine mammal is observed entering or within the relevant exclusion during pile driving, the hammer must be shut down (unless activities must proceed for human safety or installation feasibility) until:<br>• The animal is verified to have voluntarily left and heading away from the exclusion area; or<br>• 30 minutes have elapsed without re-detection (for mysticetes, sperm whales, Risso's dolphins, and pilot whales); or<br>• 15 minutes have elapsed without re-detection of other marine mammals; or<br>• Enhanced time-of-year NARW protocols are followed.<br>If shutdown is called for but the applicant determines shutdown is not technically feasible due to human safety concerns or to maintain installation feasibility, reduced hammer energy must be implemented, when the lead engineer determines it is technically feasible. | Marine Mammals (3.7) | BOEM,<br>NMFS<br>NOAA<br>BSEE |
| 24. | Construction, Operations, Decommissioning | PSO training requirements | The applicant will provide PSOs through a third-party provider. PSOs must have no tasks other than to conduct observational effort, collect and report data, and communicate with and instruct relevant vessel crew with regard to the presence of marine mammals and mitigation requirements (including brief alerts regarding maritime hazards).<br>PSOs and PAM operators must have completed a commercial PSO training program for the Atlantic Ocean with an overall examination score of 80% or greater (Baker et. al 2013). Training certificates for individual PSOs must be provided to BOEM upon request.<br>PSOs and PAM operators must be approved by NMFS prior to the start of a survey. Application requirements to become a NMFS-approved PSO for construction activities can be found at https://www.fisheries.noaa.gov/new-england-mid-atlantic/careers-and-opportunities/protected-species-observers or for geological and geophysical surveys by sending an inquiry to nmfs.psoreview@noaa.gov. The applicant must provide documentation of NMFS approval for individual PSOs to BOEM upon request.<br>For the following activities, lead PSOs must be deployed as part of the minimum number of PSOs as follows: at least one lead PSO must be on duty at any given time as the lead PSO or PSO monitoring coordinator during pile driving; at least one lead PSO must be present on each HRG survey vessel; PSOs on transit vessels must be trained but do not need to be authorized as a lead PSO. Any required lead PSOs must have prior approval from NMFS to be a lead or unconditionally approved PSO.<br>PSOs on duty must be clearly listed on daily data logs for each shift.<br>A sufficient number of PSOs, which will be consistent with the NMFS Biological Opinion and as prescribed in the final Incidental Harassment Authorization, must be deployed to record data in real time and effectively monitor the affected area for the proposed Project, including visual surveys in all directions around a pile, PAM, and continuous monitoring of sighted NARWs in the area to meet the number of PSOs required for enhanced seasonal monitoring requirements.<br>PSOs must not be on watch for more than 4 consecutive hours, with at least a 2-hour break after a 4-hour watch. PSOs must not work for more than 12 hours in any 24-hour period (NMFS 2013) unless an alternative schedule is approved by BOEM.<br>Visual monitoring must occur from the most appropriate vantage point on the associated operational platforms that allows for 360-degree visual coverage around a vessel.<br>The applicant must ensure that suitable equipment is available to PSOs, including binoculars, range-finding equipment, a digital camera, and electronic data recording devices (e.g., a tablet), to adequately monitor the distance of the watch and exclusion zones, determine the distance to protected species during surveys, record sightings and verify species identification, and record data.<br>Observations must be conducted while free from distractions and in a consistent, systematic, and diligent manner. | Marine Mammals (3.7) | BOEM<br>NOAA<br>BSEE |
| 25. | Construction, Operations, Decommissioning | Vessel strike avoidance of marine mammals (non-geophysical survey vessels) | Vessel operators and crews must maintain a vigilant watch for all marine mammals and slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any marine mammal as long as it is safe to do so. Vessel speeds must be reduced to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed within the path of the vessel.<br>**Large whales:** Avoidance measures must occur for listed whales or any other unidentified whale sighted within a 180-degree direction of the forward path of the vessel (90 degrees port to 90 degrees starboard) at a distance of 1,640 feet (500 meters) or less from a survey vessel. Trained crew or PSOs must notify the vessel captain of any whale within 1,640 feet of vessel within this area. The vessel captain must immediately implement strike-avoidance procedures to maintain a separation distance of 1,640 feet from all listed species of whales including changing vessel direction or reducing vessel speed to allow the animal to travel away from the vessel. Any time a listed whale is within 656 feet of an underway vessel, a full stop is required if safety permits. If a whale is observed but cannot be confirmed as a species other than a NARW, the vessel operator must assume that it is a NARW and take appropriate action to avoid the animal.<br>**Small cetaceans and seals**: For small cetaceans and seals, all vessels must maintain a minimum separation distance of 164 feet to the maximum extent practicable with an exception made for those animals that approach the vessel. When marine mammals are sighted while a vessel is underway, the vessel must take action as necessary to avoid violating the relevant separation distance (e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area). If marine mammals are sighted within the relevant separation distance, the vessel must reduce speed and shift the engine to neutral and not engage the engines until animals are clear of the area. | Marine Mammals (3.7) | BOEM<br>NMFS<br>BSEE |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
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| 26. | Construction, Operations, Decommissioning | Geophysical survey clearance of exclusion zone and restart protocols following shutdowns | At the beginning of each survey, active sparker and other sub-bottom profiling acoustic sound sources less than 180 kHz requiring exclusion zones (excludes the Innomar), must not be activated until a PSO has verified the 656-foot exclusion zone to be clear of all whales for a full 30 minutes and a 328-foot exclusion zone to be clear for other marine mammals for a full 15 minutes. Any time a marine mammal is sighted within the exclusion zone, the PSO will require the resident engineer or other authorized individual to cause a shutdown of the survey equipment. Geophysical survey equipment may be allowed to continue operating if marine mammals voluntarily approach the vessel (e.g., to bow ride) when the sound sources are at full operating power. The vessel operator must comply immediately with any call for a shutdown by the PSO. Any disagreement or discussion must occur only after shutdown. Following a shutdown, ramp up of the equipment may begin immediately only if visual monitoring of the exclusion zone continues throughout the shutdown, the animals causing the shutdown were visually followed and confirmed by PSOs to be outside of the exclusion zone and heading away from the vessel, and the exclusion zone remains clear of all protected species All shutdowns of geophysical survey equipment due to protected species sightings that are not re-sighted require the following monitoring periods before ramp-up procedures: 15 minutes for small cetaceans and seals and 30 minutes for ESA-listed whales, humpback whales, Kogia, and beaked whales.<br>Geophysical exclusion, survey power-up, and post-shutdown exclusion protocols must be followed for all ESA-listed species, in addition to any future ITA requirements under the Marine Mammal Protection Act for marine mammals. For non-ESA-listed marine mammals, requirements must be followed as required by NMFS through proposed Project-specific mitigation and monitoring requirements of ITAs. If an ITA is not obtained, the applicant must follow the measures above for non-listed species. | Marine Mammals (3.7) | BOEM<br>BSEE |
| 27. | Construction, Operations, Decommissioning | Vessel speed requirements November 1 through May 14 | From November 1 through May 14, all vessels associated with the proposed Project must travel at 10 knots or less when transiting to, from, or within the SWDA, except within Nantucket Sound (unless an active DMA is in place) and except in crew transfer vessels as described below. From November 1 through May 14, crew transfer vessels may travel at more than 10 knots if there is at least one visual observer on duty at all times aboard the vessel to visually monitor for large whales and real-time PAM is conducted. If a NARW is detected via visual observation or PAM within or approaching the transit route, all crew transfer vessels must travel at 10 knots or less for the remainder of that day. | Marine Mammals (3.7) | BOEM<br>NOAA<br>BSEE |
| 28. | Construction, Operations, Decommissioning | Vessel speed requirements in DMAs | All vessels, regardless of length, must travel at 10 knots or less within any NMFS-designated DMA, with the exception of crew transfer vessels as described above. Crew transfer vessels traveling within any designated DMA must travel at 10 knots or less, unless NARWs are confirmed to be clear of the transit route and SWDA for 2 consecutive days, as confirmed by either vessel-based surveys conducted during daylight hours and PAM, or by an aerial survey conducted once the lead aerial observer determines adequate visibility. If confirmed clear by one of these measures, vessels transiting within a DMA must employ at least two visual observers on duty to monitor for NARWs. If a NARW is observed within or approaching the transit route, vessels must operate at 10 knots or less until clearance of the transit route for 2 consecutive days is confirmed by the procedures described above. | Marine Mammals (3.7) | NOAA<br>BSEE |
| 29. | Construction, Operations, Decommissioning | Reporting of all NARW sightings | If a NARW is observed at any time by PSOs or personnel on any proposed Project vessels, during any Project-related activity, or during vessel transit, the applicant must immediately report the sighting information to NMFS and BOEM (the time, location, and number of animals) to the NOAA Fisheries 24-hour Stranding Hotline number (866-755-6622), the USCG via channel 16, and through the WhaleAlert app (Whale Alert Undated). | Marine Mammals (3.7) | NMFS<br>NOAA<br>BSEE |
| 30. | Construction | Adaptive refinement of exclusion zones and monitoring protocols | The applicant will reduce unanticipated impacts on marine trust resources through near-term refinement of exclusion zones by refining pile-driving monitoring protocols based on monthly or annual monitoring results, in coordination with BOEM and NMFS. The NMFS Biological Opinion and Incidental Harassment Authorization will identify minimum sizes of exclusion zones and any modifications will increase the zones and not decrease the zones. | Marine Mammals (3.7); Sea Turtles (3.8) | NMFS<br>BSEE |
| 31. | Construction | Pile-driving sound field verification plan | The applicant will conduct field verification during pile driving to ensure that noise attenuation requirements are met. A sound source verification plan will be submitted to the USACE and BOEM at renewablereporting@boem.gov, and to NMFS at incidental.take@noaa.gov for review and approval 90 days prior to the commencement of field activities for pile driving.<br>Sound field verification must be carried out for the first of each type (monopile, jacket and bottom-frame) of foundation to be installed, including vibratory and impact pile driving. To ensure that the entire action is within scope of the Project design envelope, further pile-driving installations must be monitored to effectively represent the entire construction operation, as every pile is capable of producing impact. At minimum, sound field verification must be performed at:<br>• Two installations at representative depths (one shallower, one deeper) of each pile size and each foundation type installed;<br>• One foundation installed each in November and December if any are installed in those months;<br>• One foundation in each calendar year of installation; and<br>• The installation of the largest hammer used in each of the above situations.<br>The plan must be sufficient to document sound propagation from the pile and distances to isopleths for potential injury and harassment. The measurements must be compared to the Level A and Level B harassment zones for marine mammals (and the injury and behavioral disturbance zones for sea turtles and Atlantic sturgeon). | Marine Mammals (3.7); Sea Turtles (3.8) | NMFS<br>BSEE |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
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| 32. | Construction | Pile-driving weather and time restrictions | To minimize the impacts of sun glare on visibility, no pile driving may begin until at least 1 hour after (civil) sunrise to ensure effective visual monitoring can be accomplished in all directions.<br>To minimize the impacts of sun glare on visibility and to minimize the potential for pile driving to continue after sunset when visibility will be impaired, no pile driving may begin within 1.5 hours of (civil) sunset unless an approved alternative monitoring plan is implemented.<br>Pile driving must only commence when all exclusion zones are fully visible (i.e., are not obscured by darkness, rain, fog, etc.) for at least 30 minutes. If conditions (e.g., darkness, rain, fog, etc.) prevent the visual detection of marine mammals and sea turtles in the exclusion zones, construction activities must not be initiated until the full extent of all exclusion zones are fully visible. The lead PSO will determine as to when there is sufficient light to ensure effective visual monitoring can be accomplished in all directions and when the alternative monitoring plan will be implemented. The applicant must develop and implement measures for enhanced monitoring in the event that poor visibility conditions unexpectedly arise, and pile driving cannot be stopped due to safety or operational feasibility. The applicant must prepare and submit an alternative monitoring plan to NMFS and BOEM for NMFS' review and approval at least 90 days prior to the planned start of pile driving. This plan may include deploying additional observers, alternative monitoring technologies (i.e., night vision, thermal, infrared), and/or use of PAM with the goal of ensuring the ability to maintain all exclusion zones for all ESA-listed species in the event of unexpected poor visibility conditions. | Marine Mammals (3.7); Sea Turtles (3.8) | NMFS<br>BSEE |
| 33. | Construction, Operations | Marine debris awareness and elimination | Marine debris is defined by BSEE as any object or fragment of wood, metal, glass, rubber, plastic, cloth, paper, or any other human-made item or material that is lost or discarded in the marine environment. The applicant must ensure that vessel operators, employees, and contractors engaged in offshore activities pursuant to the COP are briefed on marine debris prevention. BOEM must ensure that the applicant employees and contractors receive training to understand and implement best practices to ensure that debris is not intentionally or accidentally discharged into coastal or marine environments. Training must occur for all employees and contract personnel on the proper storage and disposal practices at-sea to reduce the likelihood of accidental discharge of marine debris at all at-sea and dockside operations that can affect protected species through entanglement or incidental ingestion. Training must include the environmental and socioeconomic impacts associated with marine trash and debris, as well as their responsibilities for ensuring that trash and debris are not intentionally or accidentally discharged into coastal and marine environments. By January 31 of each year, the applicant must submit to the U.S. Department of the Interior an annual report that describes its marine trash and debris awareness training process, number of people trained, estimated related costs, and certifies that the training process has been followed for the previous calendar year. Reports must be submitted to BOEM (renewable_reporting@boem.gov) and to BSEE (marinedebris@bsee.gov).<br>In the event that any materials unexpectedly enter the water, personnel must follow best practices to recover it if conditions are safe to do so, or notify the appropriate officials if conditions are unsafe. Briefing materials on marine debris awareness, prevention, and protected species are available at www.bsee.gov/debris. Incidents of lost debris must be reported to BSEE with a full description, including date, global positioning system coordinates, description of debris (dimensions, composition, float/sink, markings, description/characteristics), efforts to recover, and recovery success. | Marine Mammals (3.7); Sea Turtles (3.8) | BSEE<br>BSEE |
| 34. | Construction | Pile-driving reports | During the pile driving/construction period, the applicant must compile and submit weekly reports that document start and stop of all pile driving daily, the start and stop of associated observation periods by the PSOs, details on the deployment of PSOs, and a record of all observations of marine mammals and sea turtles. These weekly reports must be submitted by the PSO providers to BOEM at renewable_reporting@boem.gov and NMFS at incidental.take@noaa.gov and can consist of raw data. Weekly reports are due on Wednesday for the previous week (Sunday through Saturday). Required data and reports may be archived, analyzed, published, and disseminated by BOEM.<br>PSO data must be reported weekly (Sunday through Saturday) from the start of visual and/or PAM effort during construction activities and every week thereafter until the final reporting period. Weekly reports are due on Wednesday for the previous week. Any editing, review, and quality assurance checks must only be completed by the PSO provider prior to submission. Monthly summary reports must be submitted by the applicant in coordination with PSO providers as needed. Qualified PSOs must monitor watch and exclusion zones when using geological and geophysical equipment that may affect protected species.<br>**Reporting Instructions**<br>The applicant must submit a monthly summary report of construction activities on the 15th of each month including summaries of pile driving, vessel operations (including port departures, number, type of vessel, and route), protected species sightings, vessel strike-avoidance measures taken, and any shutdowns or takes that may have potentially occurred, as follows:<br>• The applicant must require PSO providers to submit PSO data in Excel format every 7 days.<br>• Data must be collected in accordance with standard reporting forms, software tools, or electronic data forms approved by BOEM for the particular activity.<br>• Forms must be filled out for each vessel with PSOs aboard.<br>• Do not use NA for unfilled cells; leave them empty.<br>• Submit report in Word and Excel formats (do not submit a pdf).<br>• All dates must be entered as YYYY-MM-DD.<br>• All times must be entered in 24 Hour UTC as HH:MM.<br>• New entries should be made on the Effort form each time a pile segment or weather conditions change and at least once an hour as a minimum.<br>• Both weekly and monthly reports must be submitted to BOEM at renewable_reporting@boem.gov. Always check forms for completeness and resolve any problems before submittal. Name the file: Lease#_ ProjectName_PSOData_YearMonthDay to YearMonthDay.xls<br>The applicant will report the following Project, Operations, Detection, and Effort data fields in Excel format as weekly reports during construction. These data may be generated through software applications or otherwise recorded electronically by PSOs. Applications developed to record PSO data are encouraged as long as the data fields listed below can be recorded and exported to Excel. Alternatively, BOEM has developed an Excel spreadsheet with all the necessary data fields available upon request. | Marine Mammals (3.7); Sea Turtles (3.8) | NMFS<br>NOAA<br>BSEE |

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| | | | **Project Information for Pile Driving**<br>• Project name<br>• Lease number<br>• State coastal zones<br>• PSO contractor(s)<br>• Vessel name(s)<br>• Reporting dates<br>• Sound sources including hammer type(s) and power levels used<br>• Visual monitoring equipment used (e.g., bionics, magnification, infrared cameras, etc.)<br>• Distance-finding method used<br>• PSO names and training<br>• Observation height above sea surface<br>**Operations Information for Pile Driving**<br>• Date<br>• Hammer type (make and model)<br>• Greatest hammer power used for each pile<br>• Pile identifier and pile number for the day (e.g., pile two of three for the day)<br>• Pile diameters<br>• Pile length<br>• Pile locations (latitude and longitude)<br>• Time pre-exclusion visual monitoring began in UTC (HH:MM)<br>• Time pre-exclusion monitoring ended in UTC (HH:MM)<br>• Time pre-exclusion PAM monitoring began in UTC (HH:MM)<br>• Time PAM monitoring ended in UTC (HH:MM)<br>• Duration of pre-exclusion and PAM visual monitoring<br>• Time power up/ramp up began<br>• Time equipment full power was reached<br>• Duration of power up/ramp up<br>• Time pile driving began (hammer on)<br>• Time pile-driving activity ended (hammer off)<br>• Duration of activity<br>• Shutdown/power-down occur (Y/N)<br>• Time shutdown was called for (UTC)<br>• Time equipment was shut down (UTC)<br>• Record any habitat or prey observations<br>• Record any marine debris sighted<br>**Detection Information for Protected Species**<br>• Date (YYYY-MM-DD)<br>• Sighting ID (V01, V02, or sequential sighting number for that day) (multiple sightings of same animal or group should use the same ID)<br>• Date and time at first detection in UTC (YY-MM-DDT HH:MM)<br>• Time at last detection in UTC (YY-MM-DDT HH:MM)<br>• PSO name(s) (Last, First)<br>• Effort (ON=source on; OFF =source off)<br>• Latitude (decimal degrees dd.ddddd), longitude (decimal degrees dd.ddddd)<br>• Compass heading of vessel (degrees)<br>• Water depth (meters)<br>• Swell height (meters)<br>• Douglas sea scale<br>• Precipitation<br>• Visibility (kilometers)<br>• Cloud coverage (%)<br>• Glare<br>• Sightings including common name, scientific name, or family<br>• Certainty of identification<br>• Number of adults<br>• Number of juveniles<br>• Total number of animals | | |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
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| | | | • Bearing to animal(s) when first detected (ship heading + clock face)<br>• Range from vessel (reticle distance in meters)<br>• Description (include features such as overall size; shape of head; color and pattern; size, shape, and position of dorsal fin; height, direction, and shape of blow, etc.)<br>• Detection narrative (note behavior, especially changes in relation to survey activity and distance from source vessel)<br>• Direction of travel/first approach (relative to vessel)<br>• Behaviors observed: indicate behaviors and behavioral changes observed in sequential order (use behavioral codes)<br>• If any bow-riding behavior observed, record total duration during detection (HH:MM)<br>• Initial heading of animal(s) (degrees)<br>• Final heading of animal(s) (degrees)<br>• Source activity at initial detection<br>• Source activity at final detection (on or off)<br>• Exclusion zone size during detection (meters)<br>• Animal inside or outside the exclusion zone<br>• Closest distance to vessel (reticle distance in meters)<br>• Time at closest approach (UTC HH:MM)<br>• Time animal entered exclusion zone (UTC HH:MM)<br>• Time animal left exclusion zone (UTC HH:MM)<br>• If observed/detected during ramp up/power up: first distance (reticle distance in meters), closest distance (reticle distance in meters), last distance (reticle distance in meters), behavior at final detection<br>• Shut-down or power-down occurrences<br>• Detections with PAM<br>**Monitoring Effort Information for Pile Driving**<br>• Date<br>• Effort (ON=source on; OFF=source off)<br>• If visual, number of PSOs on watch at one time<br>• PSO name(s) (Last, First)<br>• Start time of observations<br>• End time of observations<br>• Duration of visual observation<br>• Wind speed (knots), from direction<br>• Swell (meters)<br>• Water depth (meters)<br>• Visibility (kilometers)<br>• Glare severity<br>• Block name and number<br>• Location: Latitude and Longitude | | |
| 35. | Construction, Operations | Monthly reporting for protected species | The applicant will provide monthly Excel format reports on geological and geophysical surveys including the data fields specified below. These reports must be submitted by the PSO provider on the 15th of each month for each vessel until the last reporting period for a survey. Any editing, review, and quality assurance checks must only be completed by the PSO provider prior to submission. These data may be generated through software applications or otherwise recorded electronically by PSOs. Applications developed to record PSO data are encouraged as long as the data fields listed below can be recorded and exported to Excel. Alternatively, BOEM has developed an Excel spreadsheet with all the necessary data fields available upon request. Final reports should be submitted by the applicant in coordination with PSO providers 90 days following completion of a survey. Final reports must contain departure and return ports, PSO names and training certifications, the PSO provider contact information, dates of the survey, a vessel track, a summary of all PSO sightings, shutdowns that occurred, vessel strike-avoidance measures taken, takes that occurred, and any injured or dead protected species that were observed.<br>PSOs must be approved by NMFS prior to the start of a survey. Application requirements to become a NMFS-approved PSO for geological and geophysical surveys can be obtained by sending an inquiry to nmfs.psoreview@noaa.gov. PSO names and training must be provided in all reports and the applicant must provide to BOEM, upon request, documentation of NMFS approval for individual PSOs.<br>**Project Information for Surveys**<br>• Project name<br>• Lease number<br>• State coastal zones<br>• Survey contractor<br>• Vessel name | Marine Mammals (3.7): Sea Turtles (3.8) | BOEM<br>BSEE |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
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| | | | • Survey type (typically HRG)<br>• Reporting start and end dates<br>• Sound sources including equipment type, power level, and frequencies used<br>• Greatest root mean squared source level<br>• Visual monitoring equipment used (e.g., bionics, magnification, infrared cameras, etc.)<br>• Distance-finding method used<br>• PSO names and training<br>• Observation height above sea surface<br>**Operations Information for Surveys**<br>• Date<br>• Time pre-exclusion visual monitoring began in UTC (HH:MM)<br>• Time pre-exclusion monitoring ended in UTC (HH:MM)<br>• Duration of pre-exclusion visual monitoring<br>• Day or night pre-exclusion<br>• Time power up/ramp up began<br>• Time equipment full power was reached<br>• Duration of power up/ramp up<br>• Time survey activity began (equipment on)<br>• Time survey activity ended (equipment off)<br>• Duration of activity<br>• Shutdown/power-down occur (Y/N)<br>• Time shutdown was called for (UTC)<br>• Time equipment was shut down (UTC)<br>• Vessel positions must be logged every 30 seconds<br>• Record any habitat or prey observations<br>• Record any marine debris sighted<br>**Detection Information for Protected Species**<br>• Date (YYYY-MM-DD)<br>• Sighting ID (V01, V02, or sequential sighting number for that day; multiple sightings of same animal or group should use the same ID)<br>• Date and time at first detection in UTC (YY-MM-DDT HH:MM)<br>• Time at last detection in UTC (YY-MM-DDT HH:MM)<br>• PSO name(s) (Last, First)<br>• Effort (ON=source on; OFF =source off)<br>• Latitude (decimal degrees dd.ddddd), Longitude (decimal degrees dd.ddddd)<br>• Compass heading of vessel (degrees)<br>• Water depth (meters)<br>• Swell height (meters)<br>• Douglas sea scale<br>• Precipitation<br>• Visibility (kilometers) Cloud coverage (%)<br>• Glare<br>• Sightings including common name, scientific name, or Family<br>• Certainty of identification<br>• Number of adults<br>• Number of juveniles<br>• Total number of animals<br>• Bearing to animal(s) when first detected (ship heading + clock face)<br>• Range from vessel (reticle distance in meters)<br>• Description (include features such as overall size; shape of head; color and pattern; size, shape, and position of dorsal fin; height, direction, and shape of blow, etc.)<br>• Detection narrative (note behavior, especially changes in relation to survey activity and distance from source vessel)<br>• Direction of travel/first approach (relative to vessel)<br>• Behaviors observed: indicate behaviors and behavioral changes observed in sequential order<br>• If any bow-riding behavior observed, record total duration during detection (HH:MM) | | |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
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| | | | • Initial heading of animal(s) (degrees)<br>• Final heading of animal(s) (degrees)<br>• Source activity at initial detection<br>• Source activity at final detection (on or off)<br>• Exclusion zone size during detection (meters)<br>• Animal inside or outside the exclusion zone<br>• Closest distance to vessel (reticle distance in meters)<br>• Time at closest approach (UTC HH:MM)<br>• Time animal entered exclusion zone (UTC HH:MM)<br>• Time animal left exclusion zone (UTC HH:MM)<br>• If observed/detected during ramp up/power up: first distance (reticle distance in meters), closest distance (reticle distance in meters), last distance (reticle distance in meters), behavior at final detection<br>• Shutdown or power-down<br>• Detected with infrared (Y/N)<br>**<u>Monitoring Effort Information for Surveys</u>**<br>• Date<br>• Effort (ON=source on; OFF=source off)<br>• If visual, number of PSOs on watch at one time<br>• PSO name(s) (Last, First)<br>• Start time of observations<br>• End time of observations<br>• Duration of visual observation<br>• Wind speed (knots), from direction<br>• Swell (meters)<br>• Water depth (meters)<br>• Visibility (kilometers)<br>• Glare severity<br>• Block name and number<br>• Location: Latitude and Longitude | | |
| 36. | Construction, Operations, Decommissioning | Vessel crew training requirements | The applicant will provide Project-specific training for all vessel crew prior to the start of in-water construction activities. Confirmation of the training and understanding of the requirements must be documented on a training course log sheet. The log sheets must be provided to BOEM upon request. All vessel crewmembers must be briefed in the identification of sea turtles and marine mammals and in regulations and best practices for avoiding vessel collisions. Reference materials must be available aboard all proposed Project vessels for identification of sea turtles and marine mammals. The expectation and process for reporting of sea turtles and marine mammals (including live, entangled, and dead individuals) must be clearly communicated and posted in highly visible locations aboard all proposed Project vessels; there is an expectation for reporting to the designated vessel contact (such as the lookout or the vessel captain) and a communication channel and process for crew members. | Marine Mammals (3.7); Sea Turtles (3.8) | NMFS<br>NOAA<br>BOEM<br>BSEE |
| 37. | Construction | Daily pre-construction surveys | The applicant will conduct PAM and visual surveys each day before pile driving begins to establish the numbers, surface presence, behavior, and travel directions of protected species in the area. These surveys will follow standard protocols and data collection specified by BOEM. In addition to standard daily surveys, the applicant must include an enhanced survey plan for November through December and May 1 through May 31 to minimize risk of exposure of NARWs to pile-driving noise that includes daily pre-construction surveys. | Marine Mammals (3.7); Sea Turtles (3.8) | NOAA |
| 38. | Construction | Submittal of raw field data collection of marine mammals and sea turtles in the pile-driving exclusion zone | If a marine mammal or sea turtle in the exclusion zone results in a shutdown or a power-down, the applicant must report the event to BOEM within 24 hours at renewable reporting@boem.gov. In addition, the data report, which is the raw data collected in the field, must be submitted by the PSO provider and include the daily form, including the date, time, species, pile identification number, global positioning system coordinates, time and distance of the animal when sighted, time the shutdown or power-down occurred, behavior of the animal, direction of travel, time the animal left the exclusion zone, time the pile driver was restarted or powered back up, and any photographs that may have been taken. This data report must be submitted to BOEM at renewable_reporting@boem.gov monthly on the 15th day of each month for the previous calendar month of activities. | Marine Mammals (3.7); Sea Turtles (3.8) | BOEM<br>BSEE |
| 39. | Construction, Operations | PSO and reporting requirements for pile driving | PSOs must be previously approved by NMFS to conduct mitigation and monitoring duties for pile-driving activity. An adequate number of PSOs must be used to adequately monitor the area of the exclusion zone. Daily PSO forms, including electronic effort, survey, and sightings forms, must be submitted to BOEM at renewable_reporting@boem.gov monthly on the 15th day of each month for the previous calendar month of activities. Required data and reports may be archived, analyzed, published, and disseminated by BOEM.<br>**<u>Detection Information for Protected Species</u>**<br>• Date (YYYY-MM-DD)<br>• Sighting ID (V01, V02, or sequential sighting number for that day) (multiple sightings of same animal or group should use the same ID) | Marine Mammals (3.7); Sea Turtles (3.8) | BOEM<br>NMFS<br>NOAA<br>BSEE |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
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| | | | • Date and time at first detection in UTC (YY-MM-DDT HH:MM)<br>• Time at last detection in UTC (YY-MM-DDT HH:MM)<br>• PSO name(s) (Last, First)<br>• Effort (ON=source on; OFF=source off)<br>• Latitude (decimal degrees dd.ddddd), Longitude (decimal degrees dd.ddddd)<br>• Compass heading of vessel (degrees)<br>• Water depth (meters)<br>• Swell height (meters)<br>• Douglas sea scale<br>• Beaufort scale<br>• Precipitation<br>• Visibility (kilometers)<br>• Cloud coverage (%)<br>• Glare<br>• Sightings including common name, scientific name, or family<br>• Certainty of identification<br>• Number of adults<br>• Number of juveniles<br>• Total number of animals<br>• Bearing to animal(s) when first detected (ship heading + clock face)<br>• Range from vessel (reticle distance in meters)<br>• Description (include features such as overall size; shape of head; color and pattern; size, shape, and position of dorsal fin; height, direction, and shape of blow, etc.)<br>• Detection narrative (note behavior, especially changes in relation to survey activity and distance from source vessel)<br>• Direction of travel/first approach (relative to vessel)<br>• Behaviors observed: indicate behaviors and behavioral changes observed in sequential order (use behavioral codes)<br>• If any bow-riding behavior observed, record total duration during detection (HH:MM)<br>• Initial heading of animal(s) (degrees)<br>• Final heading of animal(s) (degrees)<br>• Source activity at initial detection<br>• Source activity at final detection (on or off)<br>• Exclusion zone size during detection (meters)<br>• Animal inside or outside the exclusion zone<br>• Closest distance to vessel (reticle distance in meters)<br>• Time at closest approach (UTC HH:MM)<br>• Time animal entered exclusion zone (UTC HH:MM)<br>• Time animal left exclusion zone (UTC HH:MM)<br>• If observed/detected during ramp up/power up: first distance (reticle distance in meters), closest distance (reticle distance in meters), last distance (reticle distance in meters), behavior at final detection<br>• Shut-down or power-down occurrences<br>• Detections with PAM<br>**Monitoring Effort Information for Pile Driving**<br>• Date<br>• Effort (ON=source on; OFF=source off)<br>• If visual, number of PSOs on watch at one time<br>• PSO name(s) (Last, First)<br>• Start time of observations<br>• End time of observations<br>• Duration of visual observation<br>• Wind speed (knots), from direction<br>• Beaufort scale<br>• Swell (meters)<br>• Douglas sea scale<br>• Water depth (meters)<br>• Visibility (kilometers) | | |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
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| | | | • Glare severity<br>• Block name and number<br>• Location: latitude and longitude | | |
| 40. | Construction, Operations, Decommissioning | Injured/protected species reporting | The applicant will report immediately any observation of potential takes, strikes, or dead/injured protected species, regardless of the cause, to the NMFS Protected Resources Division, incidental.take@noaa.gov; NOAA Fisheries 24-hour Stranding Hotline number (866-755-6622); and BOEM at renewable_reporting@boem.gov.<br>In the event that an injured or dead marine mammal or sea turtle is sighted, the applicant must report the incident to NMFS Protected Resources Division, incidental.take@noaa.gov; NOAA Fisheries 24-hour Stranding Hotline number (866-755-6622); and BOEM at renewable_reporting@boem.gov as soon as feasible but no later than 24 hours from the sighting. The report must include the following information: (1) time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable); (2) species identification (if known) or description of the animal(s) involved; (3) condition of the animal(s) (including carcass condition if the animal is dead); (4) observed behaviors of the animal(s), if alive; (5) if available, photographs or video footage of the animal(s); and (6) general circumstances under which the animal was discovered. Staff responding to the hotline call will provide any instructions for handling or disposing of any injured or dead animals by individuals authorized to collect, possess, and transport sea turtles.<br>In the event of a suspected or confirmed vessel strike of a sea turtle by any proposed Project vessel, the applicant must report the incident to NMFS Protected Resources Division, incidental.take@noaa.gov; NOAA Fisheries 24-hour Stranding Hotline (866-755-6622); and BOEM at renewable_reporting@boem.gov as soon as feasible. The report must include the following information: (1) time, date, and location (latitude/longitude) of the incident; (2) species identification (if known) or description of the animal(s) involved; (c) vessel's speed during and leading up to the incident; (4) vessel's course/heading and what operations were being conducted (if applicable); (5) status of all sound sources in use; (6) description of avoidance measures/requirements that were in place at the time of the strike and what additional measures were taken, if any, to avoid strike; (7) environmental conditions (e.g., wind speed and direction, Beaufort scale, cloud cover, visibility) immediately preceding the strike; (8) estimated size and length of animal that was struck; (9) description of the behavior of the animal immediately preceding and following the strike; (11) estimated fate of the animal (e.g., dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared); and (12) to the extent practicable, photographs or video footage of the animal(s).<br>In addition, any occurrence of dead non-ESA-listed fish of 10 or more individual fish within established exclusion or monitoring zones must also be reported to BOEM at renewable_reporting@boem.gov as soon as feasible. | Marine Mammals (3.7); Sea Turtles (3.8) | NMFS<br>NOAA<br>BSEE |
| 41. | Construction, Operations, Decommissioning | Vessel observer requirements | The applicant must ensure that vessel operators and crew maintain a vigilant watch for marine mammals or sea turtles by slowing down, altering course, or stopping the vessel to avoid striking marine mammals or sea turtles. Vessel personnel must be provided an Atlantic reference guide that includes and helps identify marine mammals and sea turtles that may be encountered in the proposed Project area and material regarding NARW SMAs, sightings information, and reporting. When not on active watch duty, members of the monitoring team must consult NMFS' NARW reporting systems for the presence of NARWs in the proposed Project area. A visual observer aboard the vessel must monitor a vessel strike-avoidance zone around the vessel. All vessels transiting to and from the SWDA and traveling over 10 knots must have a visual observer on duty at all times. The applicant must also have a trained lookout on all vessels during all stages of the proposed Project between June 1 and November 30 to observe for sea turtles and communicate with the captain to take required avoidance measures as soon as possible if one is sighted. If a vessel is carrying a visual observer for the purposes of maintaining watch for NARWs, an additional lookout is not required, and this visual observer must maintain watch for whales and sea turtles. If the trained lookout is a vessel crewmember, this must be their designated role and primary responsibility while the vessel is transiting. Any designated crew observers should be trained in the identification of sea turtles and in regulations and best practices for avoiding vessel collisions. The trained lookout must monitor 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. | Marine Mammals (3.7); Sea Turtles (3.8) | NMFS<br>NOAA<br>BSEE |
| 42. | Construction, Operations, Decommissioning | Vessel speed requirements in SMAs | All vessels greater than or equal to 65 feet in overall length must comply with the 10-knot speed restriction in any SMA (NOAA 2022). | Marine Mammals (3.7); Sea Turtles (3.8) | NOAA |
| 43. | Construction, Operations, Decommissioning | Vessel communication of threatened and endangered species sightings | Whenever multiple proposed Project vessels are operating, the applicant will communicate any visual observations of listed species (marine mammals and sea turtles) to a PSO or vessel captains associated with other proposed Project vessels. | Marine Mammals (3.7); Sea Turtles (3.8) | BOEM<br>BSEE |
| 44. | Construction, Operations, Decommissioning | Marine mammal and sea turtle geophysical survey exclusion zones | For sparkers and similar sub-bottom profiler equipment operating below 180 kHz or within the hearing ranges of each hearing group (excluding the Innomar), minimum exclusion zone distances for ESA-listed species of marine mammals and sea turtles must be monitored at all times and be demarcated within the watch zone with effective distance-finding methods (e.g., reticle binoculars, range-finding sticks, monitoring system software). A 1,640-foot watch zone will be established in every direction around each survey vessel. All threatened and endangered species within this distance will be monitored by a third-party PSOs. A 656-foot exclusion zone must be established around each survey vessel for endangered and threatened marine mammals and sea turtles. Exclusion zones for non-ESA-listed marine mammals must be followed as required by NMFS through proposed Project-specific mitigation and monitoring requirements of ITAs. If an ITA is not required, the applicant must monitor default exclusion zones of 328 feet for all non-listed marine mammals. The exclusion zones must be established within the watch zone with accurate distance-finding methods (e.g., reticle binoculars, range-finding sticks, calibrated video cameras, and software). If the exclusion zones cannot be adequately monitored for animal presence (i.e., a PSO determines conditions are such that ESA-listed species cannot be reliably sighted within the exclusion zones), the survey must be stopped until such time that the exclusion zones can be reliably monitored. This monitoring must be carried out by approved PSOs (see specific details on PSO requirements below). For marine mammals, these requirements are for sound sources that are operating within the hearing range of marine mammals (below 180 kHz). | Marine Mammals (3.7); Sea Turtles (3.8) | BOEM<br>BSEE |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
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| 45. | Construction, Operations, Decommissioning | Geophysical survey off-effort PSO monitoring | During good daylight conditions during periods when survey equipment is not operating (e.g., daylight hours; Douglas sea state scale 3 or less), to the maximum extent practicable, visual PSOs must conduct observations for comparison of sighting rates and behavior with and without use of the acoustic source and between acquisition periods. | Marine Mammals (3.7); Sea Turtles (3.8) | BOEM<br>BSEE |
| 46. | Construction, Operations, Decommissioning | Geophysical survey vessel whale strike-avoidance and equipment shutdown protocols | Avoidance measures must occur for listed whales or any other unidentified whale sighted within a 180-degree direction of the forward path of the vessel (90 degrees port to 90 degrees starboard) at a distance of 1,640 feet or less from a survey vessel. PSOs must notify the vessel captain of any whale within 1,640 feet of vessel within this area. The vessel captain must immediately implement strike-avoidance procedures to maintain a separation distance of 1,640 feet) from listed whales including changing vessel direction or reducing vessel speed to allow the animal to travel away from the vessel.<br>Any time a listed species (sea turtles, whales, and manta rays) is within a 656-foot avoidance zone in any direction around a survey vessel, PSOs must notify the vessel captain that a full stop is required if safety permits. The PSO must also notify the resident engineer that a shutdown of all active sparker sources below 180 kHz is immediately required. The vessel operator and crew must comply immediately with any call for a shutdown by the PSO. Any disagreement or discussion must occur only after shutdown. | Marine Mammals (3.7); Sea Turtles (3.8) | BOEM<br>BSEE |
| 47. | Construction, Operations, Decommissioning | Periodic underwater surveys, reporting, and monofilament and other fishing gear cleanup around WTG foundations | The applicant will monitor indirect impacts associated with charter and recreational gear lost from expected increases in fishing around WTG foundations. Surveys by remotely operated vehicles, divers, or other means will inform frequency and locations of debris removal to decrease ingestion by and entanglement of marine species.<br>The results of the surveys will be reported to BOEM (renewable_reporting@boem.gov) by April 30 for the preceding calendar year in which the survey is performed. Reports will be submitted in Word format. Photographic and videographic materials will be provided on a drive in a lossless format such as TIFF or Motion JPEG 2000. Reports will include daily survey reports that include the date, contact information of the operator, location and pile identification number, photographic and/or video documentation of the survey and debris encountered, any animals sighted, and the disposition of any located debris (i.e., removed or left in place). Required data and reports may be archived, analyzed, published, and disseminated by BOEM. | Marine Mammals (3.7), Sea Turtles (3.8); Birds (G.2.4) | BOEM<br>BSEE |
| 48. | Construction, Operations, Decommissioning | Sea turtles avoidance and exclusion zones during geophysical surveys | Vessel operators and crews must maintain a vigilant watch for all protected marine species and slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any ESA-listed species. The presence of a single species at the surface may indicate the presence of submerged animals in the vicinity; therefore, precautionary measures should always be exercised. A visual observer aboard the vessel must monitor a vessel strike-avoidance zone (species-specific distances detailed below) around the vessel according to the parameters stated below to ensure the potential for strike is minimized. Minimum exclusion zone distances for ESA-listed sea turtles must be monitored at all times and demarcated within the watch zone with effective distance-finding methods (e.g., reticle binoculars, range-finding sticks, monitoring system software). A 1,640-foot watch zone will be established in every direction around each survey vessel. All threatened and endangered species within this distance will be monitored by third-party PSOs and survey operations and listed species data recorded. A 656-foot exclusion zone must be established around each survey vessel for endangered and threatened sea turtles. The exclusion zone is the distance within which vessel avoidance measures to maintain a distance of 656-feet or greater is not possible, and a sparker or boomer source must be shut down. Exclusion zone requirement applies when a sound source is used within the hearing range of sea turtles. Survey vessel crewmembers responsible for navigation duties must receive site-specific training on ESA-listed species sighting/reporting and vessel strike-avoidance measures. Visual observers monitoring the vessel strike-avoidance zone can be either third-party PSOs or crewmembers, but crewmembers responsible for these duties must be provided sufficient training to distinguish ESA-listed species to broad taxonomic groups and have no other responsibilities during the time of observation. If the exclusion zones cannot be adequately monitored for animal presence (i.e., a PSO determines conditions are such that ESA-listed species cannot be reliably sighted within the exclusion zones), the survey must be stopped until such time that the exclusion zones can be reliably monitored. This monitoring must be carried out by NMFS-approved PSOs. | Sea Turtles (3.8) | BOEM<br>BSEE |
| 49. | Construction | Pile-driving monitoring plan and PSO reporting requirements for sea turtles | The applicant will submit a pile-driving monitoring plan to BOEM and NMFS for review and approval a minimum of 90 days prior to the commencement of pile-driving activities. The plan must:<br>• Confirm that the full extent of the harassment distances (175 decibels root mean squared) from piles are monitored for sea turtles to ensure that all potential take is documented;<br>• Include (1,640 feet) exclusion zones and exclusion zone modification protocols and approvals required;<br>• Include number of PSOs and/or Native American monitors that will be used, the platforms and/or vessels upon which they will be deployed, and contact information for the PSO provider(s); and<br>• Include measures for enhanced monitoring capabilities if poor visibility conditions unexpectedly arise, and pile driving cannot be stopped.<br>The plan may also include deploying additional observers and using night vision goggles with the goal of ensuring the ability to maintain all exclusion zones in the event of unexpected poor visibility conditions. A communication plan detailing the chain of command, mode of communication, and decision authority must be described. PSOs must be previously approved by NMFS to conduct mitigation and monitoring duties for pile-driving activity. An adequate number of PSOs must be used to adequately monitor the area of the exclusion zone. Daily PSO forms, including electronic effort, survey, and sightings forms, must be submitted to BOEM at renewable_reporting@boem.gov monthly on the 15th day of each month for the previous calendar month of activities. Required data and reports may be archived, analyzed, published, and disseminated by BOEM. | Sea Turtles (3.8) | NMFS<br>NOAA<br>BSEE |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
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| 50. | Construction | Pile-driving noise reporting and clearance zone adjustment for sea turtles | Before driving any additional piles following underwater noise measurements, the applicant must review the initial field measurement results and make any necessary adjustments to the sound attenuation system and/or the sea turtle exclusion or monitoring zones as detailed below. If the initial field measurements indicate that the isopleths of concern are larger than those considered, in coordination with BOEM, NMFS, and the USACE, the applicant must ensure that additional sound attenuation measures are in place before additional piles are installed. Additionally, the exclusion and monitoring zones must be expanded to match the actual distances to the isopleths of concern. If the exclusion zones are expanded beyond 1.5 kilometers (0.9 mile), additional observers must be deployed on additional platforms, with each observer responsible for maintaining watch in no more than 180 degrees an area with a radius no greater than 1.5 kilometers (0.9 mile). The applicant must provide the initial results of the field measurements to NMFS, BOEM, and the USACE as soon as they are available; NMFS, BOEM, and the USACE will discuss these as soon as feasible with a target for that discussion within 2 business days of receiving the results. BOEM and NMFS will provide direction to the applicant on whether any additional modifications to the sound attenuation system or changes to the exclusion or monitoring zones are required. BOEM must also discuss the potential need for re-initiation of consultation, if appropriate, with NMFS. | Sea Turtles (3.8) | NMFS<br>BSEE |
| 51. | Construction | Pile-driving exclusion zones (no-go zones) for sea turtles | To ensure that pile-driving operations are carried out in a way that minimizes the exposure of listed sea turtles to noise that may result in injury or behavioral disturbance, PSOs will establish a 1,640-foot (500-mile) exclusion zone for all pile-driving activities. | Sea Turtles (3.8) | NMFS<br>BSEE |
| 52. | Construction, Operations, Decommissioning | Vessel strike avoidance of sea turtles (non-geophysical survey vessels) | During all phases of the proposed Project, Project vessel operators and crews must maintain a vigilant watch for all sea turtles and slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any sea turtles as long as it is safe to do so. All vessels must maintain a minimum separation distance of 328 feet from sea turtles whenever possible. Trained crew lookouts must monitor seaturtlesightings.org daily and prior to each trip to note and report any observations of sea turtles in the vicinity of the planned transit to all vessel operators and captains and lookouts on duty that day. If a sea turtle is sighted within 328 feet of the operating vessels' forward path, the vessel operator must slow down to 4 knots (unless unsafe to do so) and may resume normal vessel operations once the vessel has passed the sea turtle. If a sea turtle is sighted within 164 feet of the forward path of the operating vessel, the vessel operator must shift to neutral when safe 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 328 feet at which time normal vessel operations may be resumed. Between June 1 and November 30, vessels must avoid transiting through areas of visible jellyfish aggregations or floating vegetation lines or mats. In the event that operational safety prevents avoidance of such areas, vessels must slow to 4 knots while transiting through such areas. | Sea Turtles (3.8) | NMFS<br>BSEE |
| 53. | Construction, Operations, Decommissioning | Geophysical survey exclusion zone, power-up, and restart procedures | The applicant will apply the following limitations and conditions to geophysical surveys:<br>• At the beginning of each survey, active acoustic sound sources operating at less than 200 kHz must not activated until a PSO has verified the 656-foot pre-survey exclusion zones to be clear of all sea turtles for a full 30 minutes. Any time a sea turtle is sighted within the exclusion zone, the PSO will require the resident engineer or other authorized individual to shut down the survey equipment if power-up procedures have started. The vessel operator must comply immediately with any call for a shutdown by the PSO. Any disagreement should be discussed only after shutdown.<br>• At full power, a shutdown of sparker equipment must occur any time a sea turtle is sighted within 164 feet of the vessel. Following a shutdown for any reason or when sea turtles are sighted within 164 feet of the survey vessel, ramp up of the equipment may begin immediately only if visual monitoring of the exclusion zone continues throughout the shutdown and all animals are confirmed by PSOs to be outside of the exclusion zone throughout the shutdown. All shutdowns of geophysical survey equipment due to protected species sightings that are not re-sighted require the 30-minute clearance period before ramp-up procedures. | Sea Turtles (3.8) | BOEM<br>BSEE |
| 54. | Operations | Post-installation cable monitoring | The applicant must provide BOEM and NOAA 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 human-made hazards, and site conditions along federal sections of the cable routing.<br>In federal waters, the initial inter-array and export cable inspection will be carried out within 6 months of commissioning, and subsequent inspections will 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. Post-storm surveys will be focused on areas of concern following an analysis of the DTS data. 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.<br>In addition to inspection, the export cable will be monitored continuously with the as-built DTS system. If DTS data indicate that burial conditions have deteriorated or changed significantly and remedial actions are warranted, the DTS 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.<br>The DTS 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). | Commercial Fisheries and For-Hire Recreational Fishing (3.9) | BOEM<br>BSEE |
| 55. | Construction, Operations, Decommissioning | Fisheries compensation program | The applicant will implement the following compensation programs consistent with BOEM's draft guidance for mitigating impacts on commercial fisheries and for-hire recreational fishing):<br>• A gear loss and damage compensation program to address the impact-producing factor for presence of structures during construction and operations by reducing impacts resulting from loss of gear associated with uncharted obstructions resulting from the proposed Project.<br>• A compensation program for lost income from commercial fisheries and for-hire recreational fishing activities and other eligible fishing interests for lost income during construction and a minimum of 5 years post-construction. | Commercial Fisheries and For-Hire Recreational Fishing (3.9) | BOEM<br>BSEE |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
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| 56. | Construction, Operations | Trawl-friendly cable protection design | The applicant will design cable protection measures to reflect the existing conditions at the site and specifically avoid introducing new hangs for mobile fishing gear by making cable protection measures "trawl-friendly" with tapered/sloped edges. If cable protection is necessary in "non-trawlable" habitat, such as rocky habitat, the applicant will use materials that mirror that benthic environment. | Commercial Fisheries and For-Hire Recreational Fishing (3.9) | BOEM<br>BSEE |
| 57. | Construction, Operations, Decommissioning | Daily two-way communication during construction | The applicant will establish clear daily two-way communication channels between fishermen and the proposed Project Marine Coordinator (or suitable surrogate) during construction. The applicant will be responsible for ensuring this applies to contractors and sub-contractors. | Commercial Fisheries and For-Hire Recreational Fishing (3.9) | NMFS |
| 58. | Construction, Operations | Trawl survey for finfish and squid | To support a before-after control impact analysis, sampling will occur before, during, and 1 year after construction both within the proposed Project footprint, as well as at control sites. A total of 40 tows, 20 in the proposed Project area and 20 in control areas, will be conducted four times per year. The applicant will collect and process stomach and otolith samples from sampling and provide this information to BOEM and NOAA. The survey methodology may be adapted over time based on the results obtained and feedback from various stakeholders. | Commercial Fisheries and For-Hire Recreational Fishing (3.9); Other Uses (3.14) | NMFS<br>BSEE |
| 59. | Construction, Operations | Ventless trap surveys | Ventless trap surveys will be conducted to allow for comparison with 2019 baseline sampling. Surveys will occur before, during, and 1 year after construction. The ventless trap survey will follow the protocols of the coast-wide ventless trap survey, with six traps alternating between vented and ventless; this method has been adopted by New York, Connecticut, Rhode Island, Massachusetts, and New Hampshire, and has been accepted by the Atlantic States Marine Fisheries Commission. There will be 15 sampling sites in the 501N study area and 15 in the control area, for a total of 30 stations. Each location will be sampled two times per month from May 15 to October 31 with a target soak time of 3 to 5 days. To alleviate concerns relative to NARWs, the traps will use weak-link technology to minimize whale entanglement, and no sampling may occur between November and early May, when NARWs may be in the area. Additionally, the applicant will tag lobsters, which it is currently doing voluntarily, and record all reported recaptures of tagged lobsters. The applicant is currently equipping some pots with sensors to record bottom temperature, salinity, pH, and dissolved oxygen, and the applicant will discuss these data in survey reports. The survey methodology may be adapted over time based on the results obtained and feedback from various stakeholders. | Commercial Fisheries and For-Hire Recreational Fishing (3.9); Other Uses (3.14) | NMFS<br>BSEE |
| 60. | Construction | Conduct additional investigations of any previously identified submerged landform features that cannot be avoided | The applicant will fund a mitigation plan to resolve impacts on the unavoidable submerged landform features identified during marine archaeological surveys of the SWDA and OECC that remain in the area of potential effects. The mitigation plan will include collection of up to two additional vibracores in each of the unavoidable submerged landform features; laboratory analyses of subsamples collected from the cores where terrestrial soils were identified (Carbon 14 dating, bulk geochemical analysis of nitrogen, pollen analysis, and microdebitage analysis); and a professional report of results suitable for technical audiences. Tribal representatives will have the opportunity to be present for all stages of work, including core collection, core opening, and core sub-sampling. The mitigation plan will also include the development of educational and documentary materials, including PowerPoint presentations prepared for a non-technical audience, digital geodatabase in ArcGIS documenting the landform features and the study activities (known boundaries of landforms, core locations), assistance to tribes in configuring their own geographic information system software on their own computers, and an in-person presentation on the study prepared for non-technical audience. | Cultural Resources (3.10) | BOEM<br>BSEE |
| 61. | Construction | Avoid or investigate submerged potential historic properties identified as a result of future marine archaeological resources identification surveys | The applicant will avoid or investigate potential submerged archaeological resources identified as a result of future marine archaeological resources identification surveys that will be performed in any portions of the area of potential effects not previously surveyed, including:<br>• Any *potential archaeological resource* (i.e., one or more geophysical survey anomalies or targets with the potential to be an archaeological resource) will be avoided. If avoidance is not possible, the anomaly or target will be assessed to BOEM's satisfaction using industry-standard ground-truthing techniques to determine whether it constitutes an identified archaeological resource.<br>• Any *identified archaeological resource* will be avoided. If avoidance is not possible, additional investigations will be performed to determine eligibility for listing in the National Register of Historic Places.<br>• Any *submerged landform features* that may be contributing elements to the Nantucket Sound traditional cultural property or are outside the boundaries of the Nantucket Sound traditional cultural property and are considered contributing elements to a cultural landscape will be avoided or additional mitigations will be required for resolving adverse effects pursuant to 36 CFR § 800.6. If avoidance is not possible, each unavoidable landform feature will be subject to the same mitigation plan and will be used to resolve effects to the known unavoidable submerged landform features to conduct additional investigations and development of educational and documentary materials, as discussed above.<br>• Any *archaeological resources determined eligible for listing on the National Register of Historic Places* (i.e., historic properties) will be avoided or subjected to a Phase III data recovery plan, pursuant to 36 CFR § 800.6. | Cultural Resources (3.10) | BOEM<br>BSEE |
| 62. | Construction | Onshore archaeological monitoring | The applicant will provide archaeological monitoring during onshore construction in areas identified as having high or moderate archaeological sensitivity and implement a terrestrial post-review discoveries plan to reduce potential impacts on any previously undiscovered archaeological resources (if present) encountered during construction by preventing further physical impacts on the archaeological resources. | Cultural Resources (3.10) | BOEM<br>BSEE |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
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| 63. | Construction, Operations, Decommissioning | Environmental data sharing with federally recognized Native American tribes | The applicant will share with federally recognized Native American tribes with which it is engaged in government-to-government consultation on the proposed Project (unless a tribe specifically requests not to receive the information) the data and reports generated as a result of the benthic monitoring plan; optical surveys of benthic invertebrates and habitat; evaluation of additional benthic habitat data in Muskeget Channel prior to cable lay operations; PAM; trawl survey for finfish and squid; reporting of all NARW sightings; injured/protected species reporting; NARW PAM monitoring; reporting of marine mammals and sea turtles in the pile-driving exclusion zone; PSO elements of weekly and monthly pile-driving reports; monthly construction summaries, including pile-driving reports; PSO and reporting requirements for pile driving; monthly reporting for protected species; vessel strike reporting for sea turtles; and other injured/dead protected species reporting. The federally recognized tribes with which the data and reports must be shared include, but are not limited to, the Delaware Nation; the Delaware Tribe of Indians; the Mashantucket (Western) Pequot Tribal Nation; the Mashpee Wampanoag Tribe of Massachusetts; the Mohegan Tribe of Indians of Connecticut; the Narragansett Tribe; the Shinnecock Indian Nation; and the Wampanoag of Gay Head (Aquinnah). | Cultural Resources (3.10) | Federally recognized Native American tribes |
| 64. | Construction, Operations, Decommissioning | Coordination with federally recognized Native American tribes in local hiring plan | The applicant will coordinate with federally recognized Native American tribes in the local hiring plan to facilitate its direct hiring of members of federally recognized Native American tribes, when possible and appropriate. | Cultural Resources (3.10); Environmental Justice (3.12) | Federally recognized Native American tribes |
| 65. | Construction | Engagement with federally recognized Native American tribes regarding fishing compensation, trust, and innovation funds | The applicant will develop and implement an engagement plan to increase awareness of and potential participation in proposed commercial fishery and other compensation funds among environmental justice communities, including federally recognized Native American tribes. The applicant will be required to host at least one outreach event, held virtually online or in person, with each of the federally recognized Native American tribes that are interested and eligible, based on geographic location, to participate in the listed programs. | Cultural Resources (3.10), Environmental Justice (3.12) | Federally recognized Native American tribes |
| 66. | Construction, Operations, Decommissioning | Local hiring plan | The applicant will prepare and implement a local hiring plan to maximize its direct hiring of residents of southeastern Massachusetts and Connecticut. Components of the plan will include coordination with unions, training facilities, and schools. | Environmental Justice (3.12) | BOEM<br>BSEE |
| 67. | Construction, Operations, Decommissioning | Submarine cable system burial plan | A copy of the submarine cable system burial plan, depicting the precise planned locations and burial depths of the entire cable system will be submitted by the applicant as part of its facility design report and fabrication and installation report. This plan will be reviewed by the USCG and BOEM. The USCG review will specifically address potential impacts on federal aids to navigation. | Navigation and Vessel Traffic (3.13) | USCG Recommended Mitigation 1c<br>BSEE |
| 68. | Construction | Boulder relocation reporting | The applicant will report the locations of any boulders (which will protrude less than 6.5 feet [2 meters]) or more on the sea floor) relocated during cable installation activities to BOEM, MassDEP, Massachusetts CZM, the USCG, NOAA, and the local harbormaster within 30 days of relocation. These locations must be reported in latitude and longitude degrees to the nearest 10 thousandth of a decimal degree (roughly the nearest meter), or as precise as practicable. | Navigation and Vessel Traffic (3.13) | BOEM<br>BSEE |
| 69. | Construction, Operations, Decommissioning | Vessel safety practices | All proposed Project vessels involved in construction, operations, and decommissioning activities will comply with U.S. or International Convention for the Safety of Life at Sea standards, as applicable, with regard to vessel construction, vessel safety equipment, and crewing practices. | Navigation and Vessel Traffic (3.13) | USCG |
| 70. | Construction, Operations, Decommissioning | WTG and ESP marking | The applicant will mark each WTG and ESP with PATONs, subject to the approval of the Commander (dpw-1), First Coast Guard District. The applicant will:<br>• Provide BOEM and USCG with a proposed lighting, marking, and signaling plan, which must be approved by BOEM after consultation with the USCG. The plan should conform to the International Association of Marine Aids to Navigation and Lighthouse Authorities Recommendation O-139, The Marking of Man-Made Offshore Structures. Should any part of the recommendation conflict with federal law or regulation, or if the applicant seeks an alternative to the recommendation, the applicant must consult with the USCG.<br>• Mark each individual WTG and ESP with clearly visible, unique, alphanumeric identification characters.<br>• Light each WTG and ESP in a manner that is visible by mariners in a 360-degree arc around the WTG and ESP.<br>• Apply to the First Coast Guard District to establish PATONs for the facility. Approval for all PATONs must be obtained before installation of structures begins.<br>• Ensure each WTG is lighted with red obstruction lighting consistent with the FAA Advisory Circular 70/7460-1L Change 2 (FAA 2018), so long as this requirement does not preclude the use of an aircraft detection lighting system.<br>• Provide signage that covers 360 degrees of the wind turbine structures warning vessels of the air draft of the turbine blades as determined at highest astronomical tide.<br>• Cooperate with the USCG and NOAA to ensure that cable routes and wind turbines are depicted on appropriate government produced and commercially available nautical charts.<br>• Provide mariner information sheets on the applicant's website with details on the location of the turbines and specifics such as blade clearance above sea level. | Navigation and Vessel Traffic (3.13) | USCG |
| 71. | Construction, Operations, Decommissioning | USCG training and exercises | The applicant will participate in periodic USCG-coordinated training and exercises to test and refine notification and shutdown procedures and to provide SAR training opportunities for USCG vessels and aircraft. | Navigation and Vessel Traffic (3.13) | USCG |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
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| 72. | Construction, Operations, Decommissioning | Mooring attachments and access ladders | The applicant will place mooring attachments (for securing vessels) and access ladders for use in emergencies on each WTG and ESP foundation. Plans for the design and placement of access ladders will be submitted for USCG review and BOEM approval. | Navigation and Vessel Traffic (3.13) | USCG |
| 73. | Construction, Operations, Decommissioning | Marine communications analysis and coordination | The applicant will conduct a marine radar study to evaluate potential radar impacts and identify potential future mitigation measures, the results of which will be discussed with BOEM and the USCG. BOEM and the USCG may later work with the applicant to implement any identified mitigations. | Navigation and Vessel Traffic (3.13) | USCG |
| 74. | Construction, Operations, Decommissioning | Operations and maintenance plan | Prior to operations of the proposed Project, the applicant will submit a written plan for operations and maintenance, which includes control center(s), for review by BOEM and the USCG. The plan must demonstrate that the control center(s) will be adequately staffed to perform standard operating procedures, communications capabilities, and monitoring capabilities. The plan will include, but not be limited to, the following topics, which may be modified through ongoing discussions with the USCG:<br>• Standard Operating Procedures: This includes methods for establishing and testing WTG rotor shutdown; methods of lighting control; method(s) for notifying the USCG of mariners in distress or potential/actual SAR incidents; method(s) for notifying the USCG of any events or incidents that may impact maritime safety or security; and methods for providing the USCG with environmental data, imagery, communications and other information pertinent to SAR or marine pollution response.<br>• Staffing: This includes the number of personnel intended to staff the control center(s) to ensure continuous monitoring of WTG operations, communications, and surveillance systems.<br>• Communications: These are the capabilities to be maintained by the control center(s) to communicate with the USCG and mariners within and in the vicinity of the proposed Project area. Communications capability will at a minimum include very high frequency marine radio and landline and wireless for voice and data.<br>• Monitoring: The control center(s) should maintain the capability to monitor the applicant installation and operations in real time (including night and periods of poor visibility) for determining the status of all PATONs; searching for and locating mariners in distress upon notification of a maritime distress incident; and detection of a survivor who has climbed to the survivor's platform, if installed, on any WTG or ESP. | Navigation and Vessel Traffic (3.13) | USCG |
| 75. | Construction, Operations, Decommissioning | WTG/ESP installation | No WTG/ESP installation work may commence at the proposed Project site (i.e., on or under the water) without prior review by BOEM and the USCG of a plan to be submitted by the applicant that describes the schedule and process for erecting each WTG, including all planned mitigations to be implemented to minimize any impacts on navigation while installation is ongoing. Appropriate Notice to Mariners submissions will accompany the plan. | Navigation and Vessel Traffic (3.13) | USCG<br>BSEE |
| 76. | Construction, Operations, Decommissioning | USCG reporting | **Complaints**: On a monthly basis during installation, the applicant will provide the USCG with a description of any complaints received (either written or oral) by boaters, fishermen, commercial vessel operators, or other mariners regarding impacts on navigation safety allegedly caused by construction vessels, crew transfer vessels, barges, or other equipment. Describe any remedial action taken in response to complaints received.<br>**Correspondence**: The applicant will provide copies of any correspondence received by the applicant from other federal, state, or local agencies that mention or address navigation safety issues to the USCG.<br>**Maintenance schedule**: The applicant will provide its planned WTG maintenance schedule, forecast out to at least 1 quarter, to the USCG. Appropriate Notice to Mariners submissions will accompany each maintenance schedule. | Navigation and Vessel Traffic (3.13) | USCG |
| 77. | Construction, Operations, Decommissioning | Public participation | To ensure sufficient opportunity for the public to receive information directly from the owners/operators of the wind energy facility, the applicant will attend periodic meetings of the Southeastern Massachusetts and Rhode Island Port Safety Forums to provide briefs on the status of construction and operations and on any problems or issues encountered with respect to navigation safety. | Navigation and Vessel Traffic (3.13) | USCG |
| 78. | Construction, Operations, Decommissioning | Helicopter-landing platforms | If the applicant's ESPs include helicopter-landing platforms, those platforms will be designed and built to accommodate USCG HH60 rescue helicopters. | Navigation and Vessel Traffic (3.13) | USCG |
| 79. | Construction, Operations, Decommissioning | AIS on all proposed Project construction and operations vessels, turbines, and ESPs | The applicant will ensure that all vessels associated with construction and operations of the proposed Project are installed with operational AIS to monitor the number of vessels and traffic patterns for analysis and compliance with vessel speed requirements. | Navigation and Vessel Traffic (3.13); Other Uses (3.14) | USCG |
| 80. | Operations | Shared vessel strategy | The applicant will reduce overall vessel usage and number of trips within the areas covered by Lease Area OCS-A 0534 and Lease Area OCS-A 0501 through a shared operational strategy between the New England Wind and Vineyard Wind 1 projects, which will likely reduce environmental impacts and navigational and vessel traffic risks during operations. | Navigation and Vessel Traffic (3.13); Other Uses (3.14) | BOEM<br>BSEE |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
|---|---|---|---|---|---|
| 81. | Construction, Operations, Decommissioning | Department of Defense airspace and radar systems | The applicant will formally communicate agreement with the following provisions to de-conflict potential impacts on warning area W-105A, Nantucket ASR-9, and Falmouth ASR-8 radar systems and to address potential impacts of distributed acoustic sensing:<br>• Acknowledge that structures can withstand the daily sonic overpressures (sonic booms) and potential falling debris from dispensing chaff and flare;<br>• Confirm that the U.S. Air Force will not be held liable for any damage to property or personnel (Hold and Save Harmless clause);<br>• Notify North American Aerospace Defense Command 30 to 60 days prior to proposed Project completion for radar adverse impact management scheduling;<br>• Contribute $80,000 for radar adverse impact management execution;<br>• Curtail of operations for national security or defense purposes as described in the leasing agreement; and<br>• Coordinate with the Department of Defense and the U.S. Navy on any proposal to use distributed acoustic sensing as part of the proposed Project or associated transmission cables. | Other Uses (3.14) | Department of Defense |
| 82. | Construction, Operations, Decommissioning | Scientific survey mitigation | The applicant will fund and implement a mitigation program to address impacts from the proposed Project on recurring scientific surveys, including:<br>• **Evaluation of survey designs**: Evaluate and quantify impacts of proposed Project-related wind development activities on scientific survey operations and on provision of scientific advice to management.<br>• **Identification and development of new survey approaches**: Evaluate or develop appropriate statistical designs, sampling protocols, and methods, while determining if scientific data quality standards for the provision of management advice are maintained.<br>• **Calibration of new survey approaches**: Design and carry out necessary calibrations and required monitoring standardization to ensure continuity, interoperability, precision, and accuracy of data collections.<br>• **Development of interim provisional survey indices**: Develop interim ad hoc indices from existing non-standard data sets to partially bridge the gap in data quality and availability between pre-construction and operational periods while new approaches are being identified, tested, or calibrated.<br>• **Wind energy monitoring to fill regional scientific survey data needs**: Apply new statistical designs and carryout sampling methods to effectively mitigate survey impacts due to offshore wind activities from the applicant operations for the operational life span of the proposed Project.<br>• **Development and communication of new regional data streams**: Require new data collection, analysis, management, dissemination, and reporting systems. Changes to surveys and new approaches require substantial collaboration with fishery management, fishing industry, scientific institutions, and other partners. | Other Uses (3.14) | NOAA |
| 83. | Operations | Web-based cameras | The applicant will install up to ten strategically placed web-based cameras that the USCG could potentially access to support a SAR event. | Navigation and Vessel Traffic (3.13) | USCG |
| 84. | Construction, Operations, Decommissioning | Onshore lighting restrictions | The applicant will reduce lighting at onshore facilities, including, but not limited to, the use of the minimum number and intensity of lights necessary for safe nighttime operations and the use of full cut-off fixtures to prevent light from illuminating unnecessary areas. | Scenic and Visual Resources (3.16) | BOEM<br>BSEE |
| 85. | Construction, Operations, Decommissioning | BSEE As-bult reports | The applicant will submit the following reports to BSEE (OSWsubmittals@bsee.gov):<br>• As-built anchoring reports, including anchor drop locations, anchor pick-up locations, estimated chain/line on the seafloor (including any line sweep), and maps of all that include representations of sensitive habitats to be avoided/impact minimized;<br>• As-built reports for all dredging and cable installation documenting timing and methods used. Reports must include timing, anchor drop location, anchor pick-up location, estimated chain/line on the seafloor, any line sweep, and maps of all that include representations of sensitive habitats to be avoided/impact minimized;<br>• As-built report of cable protection measures;<br>• Trip reports for bi-annual optical survey work to confirm compliance;<br>• Tri-annual scour protection reports, starting in Year 3, along with reports documenting any subsequent repair/modification of scour protection;<br>• Trip reports for (May through October) bi-monthly plankton survey work;<br>• Copies of pre-construction, construction, and post-construction fisheries surveys (Table H-1, Measure #22);<br>• Copies of benthic monitoring reports (Measure 11) and reports on the analysis of benthic grabs and video transects (Measure #14);<br>• Trawl survey reports (Measure #58);<br>• Ventless trap survey reports (Measure #59);<br>• Boulder relocation reporting (Measure #68);<br>• Pile driving reports (Measures #34, #35, #39); and<br>• Interim (monthly) and final PSO reporting (Measures #44, #45, #46, #48, and #53). | Multiple | BSEE |

| Measure Number | Project Stage[a] | Measure Title | Measure Description | Resource Area Addressed (EIS Section) | BOEM's Identification of the Anticipated Enforcing Agency[b] |
|---|---|---|---|---|---|
| 86. | Operations | Bird mortality monitoring | Using a standardized protocol for the proposed Project, the applicant will document any dead or injured bats found on vessels and structures during construction, operations, and decommissioning. Reporting will occur within 24 hours of discovery. Handling of injured animals will occur in accordance with protocols developed by the applicant, USFWS, BOEM, and BSEE. | Birds (G.2.4) | BOEM<br>BSEE<br>USFWS |
| 87. | Construction, Operations, Decommissioning | Dark sky lighting | Where safe and feasible, implement the National Park Service's Sustainable Outdoor Lighting Specifications (NPS 2022), including:<br>• Use light-emitting diode fixtures that have a warm color hue (i.e., 2,700 Kelvin);<br>• Use recessed and fully shielded (or "full cut off") light fixtures;<br>• Do not use upward-facing lights;<br>• Use fixtures that include or can accommodate timers, motion detectors, hue adapters, and dimmers; and<br>• Use fixtures with the lowest lumens (light output) possible. | Cultural Resources (3.10); Scenic and Visual Resources (3.16); Land Use and Coastal Infrastructure (G.2.7) | BOEM<br>BSEE<br>NPS |
| 88. | Operations | Prohibit co-located foundations | The applicant will eliminate the option for co-located ESP foundations and require the proposed Project to include no more than one ESP or WTG foundation at each position in the SWDA. This measure would retain the option to mount ESP equipment on WTG platforms. | Navigation and Vessel Traffic (3.13) | BOEM<br>BSEE<br>USCG |
| 89. | Construction, Operations, Decommissioning | Avian and bat monitoring program | At least 45 calendar days before beginning surveys, the applicant must complete, obtain concurrence from the Department of Interior (DOI), and adopt an avian and bat monitoring plan, including coordination with interested stakeholders. DOI will review the avian and bat monitoring plan and provide any comments on the plan within 30 calendar days of its submittal. The applicant must resolve all comments on the avian and bat monitoring plan to DOI's satisfaction before implementing the plan. The applicant may conclude that DOI has concurred in the avian and bat monitoring plan if DOI provides no comments on the plan within 30 calendar days of its submittal date:<br>• Monitoring. Specific monitoring components will be identified as part of consultation with USFWS and will be included in the Final EIS.<br>• Annual monitoring reports. The applicant must submit to BOEM (at renewable_reporting@boem.gov), USFWS, and BSEE (at OSWSubmittals@bsee.gov) a comprehensive report after each full year of monitoring (pre- and post-construction) within 6 months of completion of the last avian survey. The report must include all data, analyses, and summaries regarding ESA-listed and non-ESA-listed birds and bats. DOI will use the annual monitoring reports to assess the need for reasonable revisions (based on subject matter expert analysis) to the avian and bat monitoring plan. DOI reserves the right to require reasonable revisions to the avian and bat monitoring plan and may require new technologies as they become available for use in offshore environments.<br>• Post-construction quarterly progress reports. The applicant must submit quarterly progress reports during the implementation of the avian and bat monitoring plan to BOEM (at renewable_reporting@boem.gov) and the USFWS by the 15th day of the month following the end of each quarter during the first full year that the proposed Project is operational. The progress reports must include a summary of all work performed, an explanation of overall progress, and any technical problems encountered.<br>• Monitoring plan revisions. Within 15 calendar days of submitting the annual monitoring report, the applicant must meet with BOEM and USFWS to discuss the monitoring results; the potential need for revisions to the avian and bat monitoring plan, including technical refinements or additional monitoring; and the potential need for any additional efforts to reduce impacts. If DOI determines after this discussion that revisions to the avian and bat monitoring plan are necessary, DOI may require the applicant to modify the avian and bat monitoring plan. If the reported monitoring results deviate substantially from the impact analysis included in the Final EIS, the applicant must transmit to DOI recommendations for new mitigation measures and/or monitoring methods.<br>• Operational reporting (operations). The applicant must submit to BOEM (at renewable_reporting@boem.gov) and BSEE (at OSWSubmittals@bsee.gov) an annual report summarizing monthly operational data calculated from 10-minute supervisory control and data acquisition for all turbines together in tabular format: the proportion of time the turbines were operational each month, the monthly average rotor speed (revolutions per minute) of spinning turbines plus 1 standard deviation, and the average pitch angle of blades (degrees relative to rotor plane) plus 1 standard deviation. DOI will use this information as inputs for avian collision risk models to assess whether the results deviate substantially from the impact analysis included in the Final EIS.<br>• Raw data. The applicant must store the raw data from all avian and bat surveys and monitoring activities according to accepted archiving practices. Such data must remain accessible to DOI and USFWS upon request for the duration of the lease. The applicant must work with BOEM to ensure the data are publicly available. The USFWS may specify third-party data repositories that must be used, such as the Motus Wildlife Tracking System or MoveBank, and such parties and associated data standards may change over the duration of the monitoring plan. | Bats (G.2.3),<br>Birds (G.2.4) | BOEM<br>BSEE<br>USFWS |
| 90. | Construction | Tree-clearing restrictions | In addition to Measure #8 in Table H-1, the applicant will avoid clearing of trees (greater than 3 inches diameter at breast height) between April 1 and October 31, unless bat surveys are conducted pursuant to current USFWS protocols and no northern long-eared bats (*Myotis keenii*) are documented. | Bats (G.2.3) | BOEM<br>BSEE<br>USFWS |

AIS = automatic identification system; ASR = airport surveillance radar; BOEM = Bureau of Ocean Energy Management; BSEE = Bureau of Safety and Environmental Enforcement; CFR = Code of Federal Regulations; COP = Construction and Operations Plan; CZM = Office of Coastal Zone Management; DMA = dynamic management area; DOI = U.S. Department of the Interior; DTS = distributed temperature sensing; EIS = environmental impact statement; ESA = Endangered Species Act; ESP = electrical service platform; FAA = Federal Aviation Administration; HAPC = habitat area of particular concern; HDD = horizontal directional drilling; HH:MM = hour:minute; HRG = high-resolution geophysical; ID = identification; ITA = Incidental Take Authorization; kHz = kilohertz; MassDEP = Massachusetts Department of Environmental Protection; NA = not applicable; NARW = North Atlantic right whale; NHPA = National Historic Preservation Act; NMFS = National Marine Fisheries Service; NOAA = National Oceanic and Atmospheric Administration; NPS = National Park Service; OECC = offshore export cable corridor; PAM = passive acoustic monitoring; PATON = private aid to navigation; PSO = protected species observer; SAR = search and rescue; SMA = seasonal management area; SWDA = Southern Wind Development Area; USACE = U.S. Army Corps of Engineers; USCG = U.S. Coast Guard; USFWS = U.S. Fish and Wildlife Service; UTC = Universal Time Coordinated; WTG = wind turbine generator; Y/N = yes/no; YY-MM-DDT = Year-Month-Day Time Zone; YYYY-MM-DD = Year-Month-Day

[a] construction = construction and installation; operations = operations and maintenance; decommissioning = conceptual decommissioning

[b] Unless otherwise specified, BSEE compliance and enforcement to reports should be submitted to OSWSubmittals@bsee.gov.

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# Appendix I
# Seascape, Landscape, and Visual Impact Assessment

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## Table of Contents



## List of Tables

## List of Figures



## List of Attachments



## Abbreviations and Acronyms

| | |
|---|---|
| ADLS | aircraft detection lighting system |
| AMSL | above mean sea level |
| APE | area of potential effects |
| BOEM | Bureau of Ocean Energy Management |
| COP | Construction and Operations Plan |
| ESP | electrical service platform |
| ft | feet |
| FOV | field of view |
| KOP | key observation point |
| m | meter |
| $m^2$ | square meters |
| MLLW | mean lower low water |
| NA | not applicable |
| ND | no data |
| RI/MA Lease Areas | Rhode Island and Massachusetts Lease Areas |
| SLIA | seascape and landscape impact assessment |
| SLVIA | seascape, landscape, and visual impact assessment |
| SWDA | Southern Wind Development Area |
| VIA | visual impact assessment |
| WTG | wind turbine generator |

# I Seascape, Landscape, and Visual Impact Assessment

## I.1 Introduction

### I.1.1 Overview

Park City Wind, LLC (applicant) proposes to construct, operate, and eventually decommission the New England Wind Project (proposed Project), which would consist of wind energy facilities generating at least 2,036 megawatts and up to 2,600 megawatts within the Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area (Lease Area) OCS-A 0534 and a portion of Lease Area OCS-A 0501. Figure I-1 shows the location of the proposed Project, as well as other approved or planned offshore wind projects within the other BOEM Renewable Energy Lease Areas offshore Rhode Island and Massachusetts (RI/MA Lease Areas).

This appendix describes the seascape, landscape, and visual impact assessment (SLVIA) methodology and key findings that BOEM used to identify the potential impacts of offshore wind structures (wind turbine generators [WTG] and electrical service platforms [ESP]) on scenic and other visual resources within the geographic analysis area. This SLVIA methodology applies to any offshore wind energy development proposed for the outer continental shelf and incorporates by reference BOEM's SLVIA methodology (Sullivan 2021). The contents of the SLVIA include:

- Section I.1, Introduction;
- Section I.2, Method of Analysis: This section describes the specific methodology used to apply the SLVIA methodology to the proposed Project;
- Section I.3, Existing Seascape, Landscape, and Visual Characteristics;
- Section I.4, Results: This section summarizes the relevant characteristics of the proposed Project that contribute to the determination of seascape and landscape impacts as well as visual impacts;
- Section I.5, References;
- Attachment I-1: Map showing the extent of potential views of proposed Project WTGs;
- Attachment I-2: Visual simulations of the proposed Project alone, other offshore wind projects without the proposed Project, and other offshore wind projects in combination with the proposed Project;
- Attachment I-3: Maps showing the field of view (FOV) of the proposed Project WTGs from selected viewpoints; and
- Attachment I-4: Intervisibility maps showing the number of combined WTGs (including the proposed Project and other offshore wind projects) potentially visible.

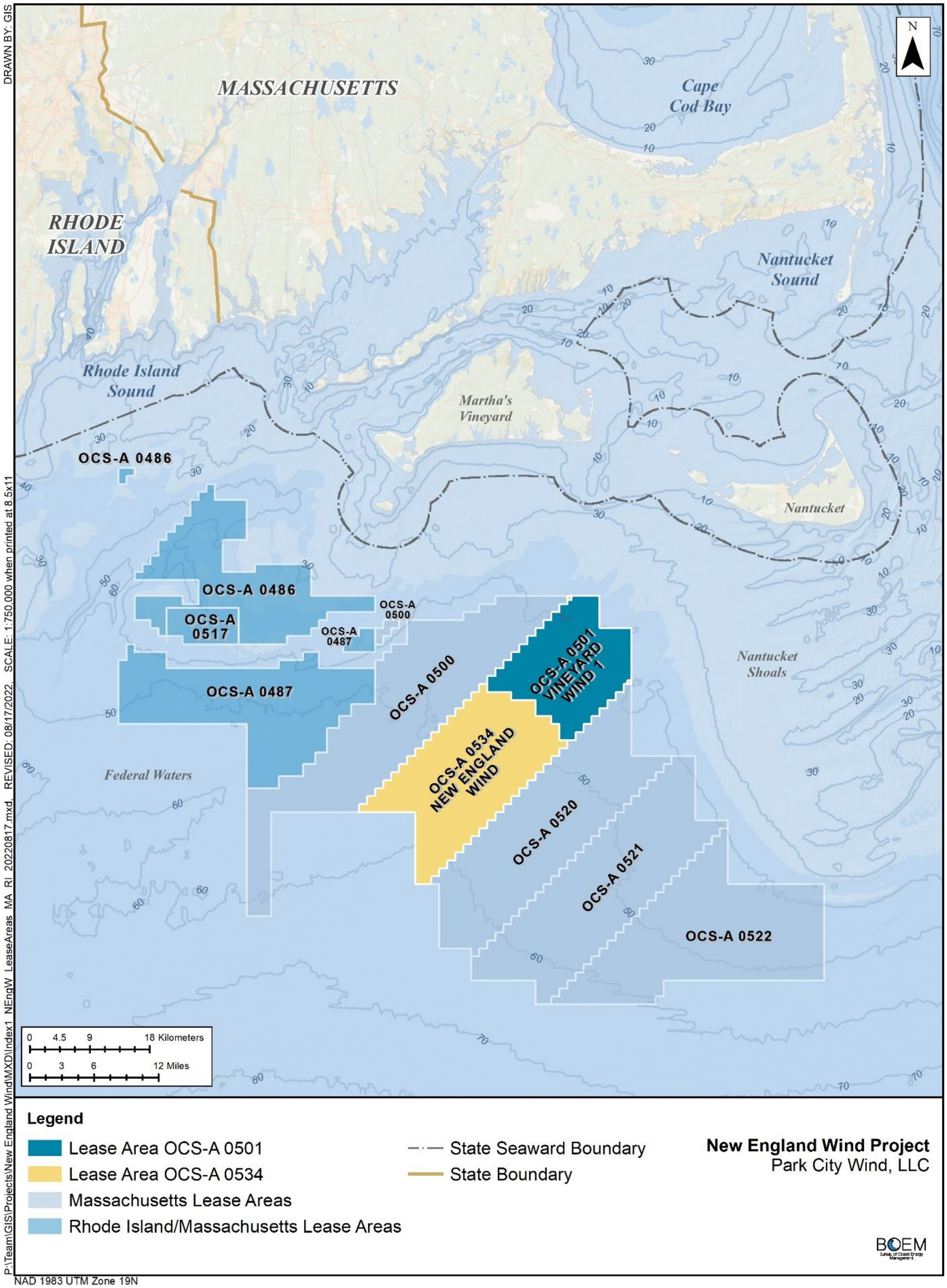



**Figure I-1: Location of Offshore Wind Energy Projects in the Rhode Island and Massachusetts Lease Areas**

### I.1.2 Description of the Proposed Project

The proposed Project would be offshore Martha's Vineyard and Nantucket, Massachusetts, and would be developed in two phases with a maximum of 130 WTGs and ESPs on foundation support structures. The portion of the lease areas developed by the applicant, referred to as the Southern Wind Development Area (SWDA) would occupy 101,590 to 111,939 acres, depending on whether unused WTG and ESP positions in Lease Area OCS-A 0501—currently assigned to the Vineyard Wind 1 Project (Vineyard Wind 1)—are assigned to the proposed Project. As defined in the Project design envelope for the proposed Project (Appendix C, Project Design Envelope and Maximum-Case Scenario), Phase 1 would be constructed immediately adjacent to Vineyard Wind 1 and would include 41 to 62 WTGs and one or two ESPs. Phase 2 would be constructed immediately south of Phase 1 and could potentially include up to 88 foundations supporting WTGs and up to 3 ESPs (Phase 2 ESP equipment could be mounted on WTG platforms; therefore, Phase 2 would not necessarily have any dedicated ESP positions). The distances between the nearest points on land on Martha's Vineyard and Nantucket and the closest and farthest proposed Project WTGs would be as follows:

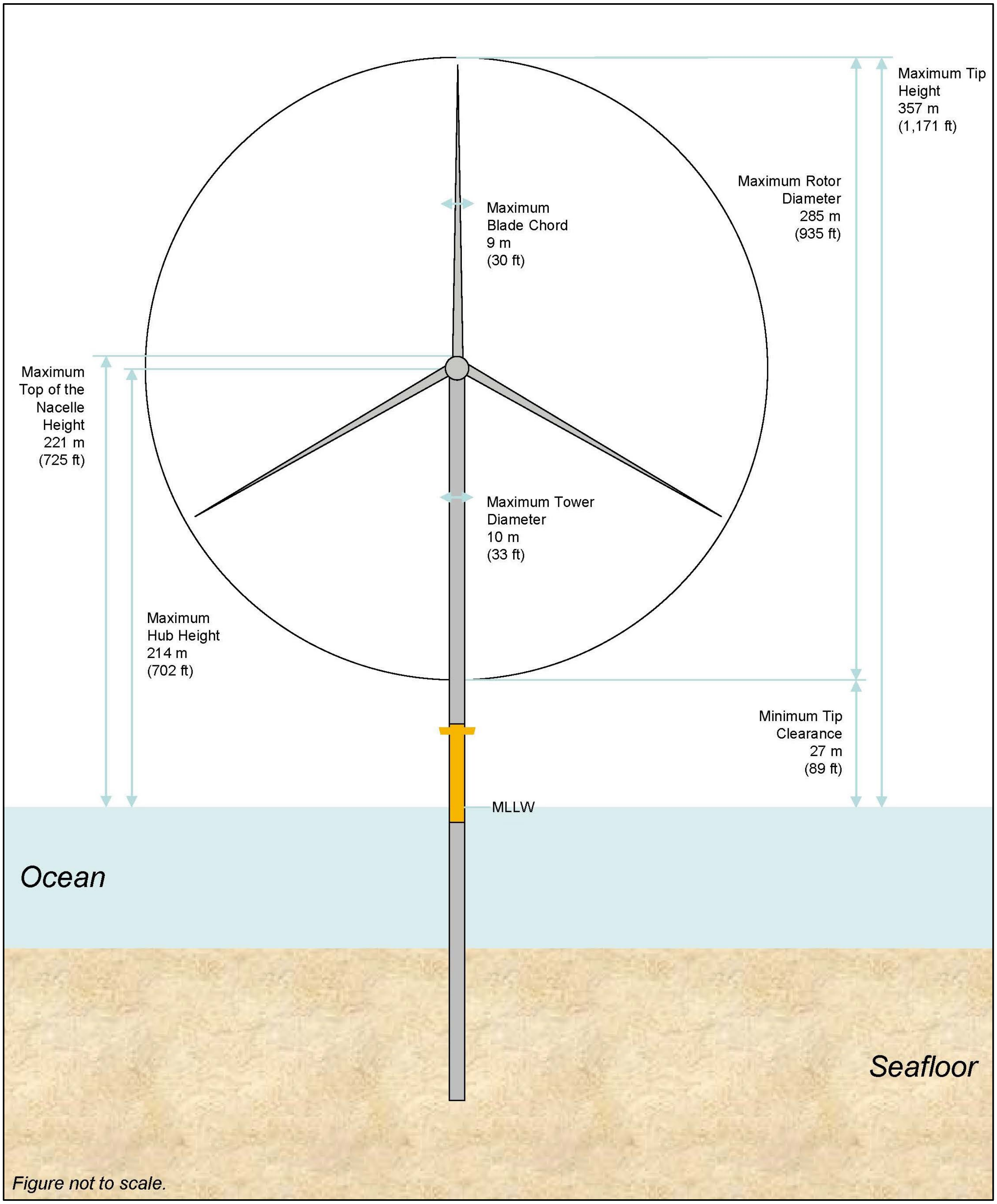
- Martha's Vineyard (Squibnocket Point), closest WTG: 21.3 miles;
- Martha's Vineyard (Squibnocket Point), farthest WTG: 38.3 miles;
- Nantucket (Madaket Beach), closest WTG: 25.2 miles; and
- Nantucket (Madaket Beach), farthest WTG: 45.4 miles.

Figure I-2 shows the maximum dimensions of the WTGs that could be constructed in both phases of the proposed Project. Figure I-3 shows the maximum dimensions of ESPs for the proposed Project. Five offshore export cables—two cables for Phase 1 and three cables for Phase 2—would transmit electricity from the WTGs and ESPs to shore. The applicant has not selected a specific WTG design for the proposed Project. To capture the maximum seascape, landscape, and visual impacts of the proposed Project, this appendix evaluates the maximum-case scenario for WTG dimensions—725 feet above mean lower low water (MLLW) to the top of the WTG nacelle (the housing located at the top of the WTG column, where the hub and blades are attached), and a maximum vertical blade tip extension of 1,171 feet above MLLW.

## I.2 Methodology

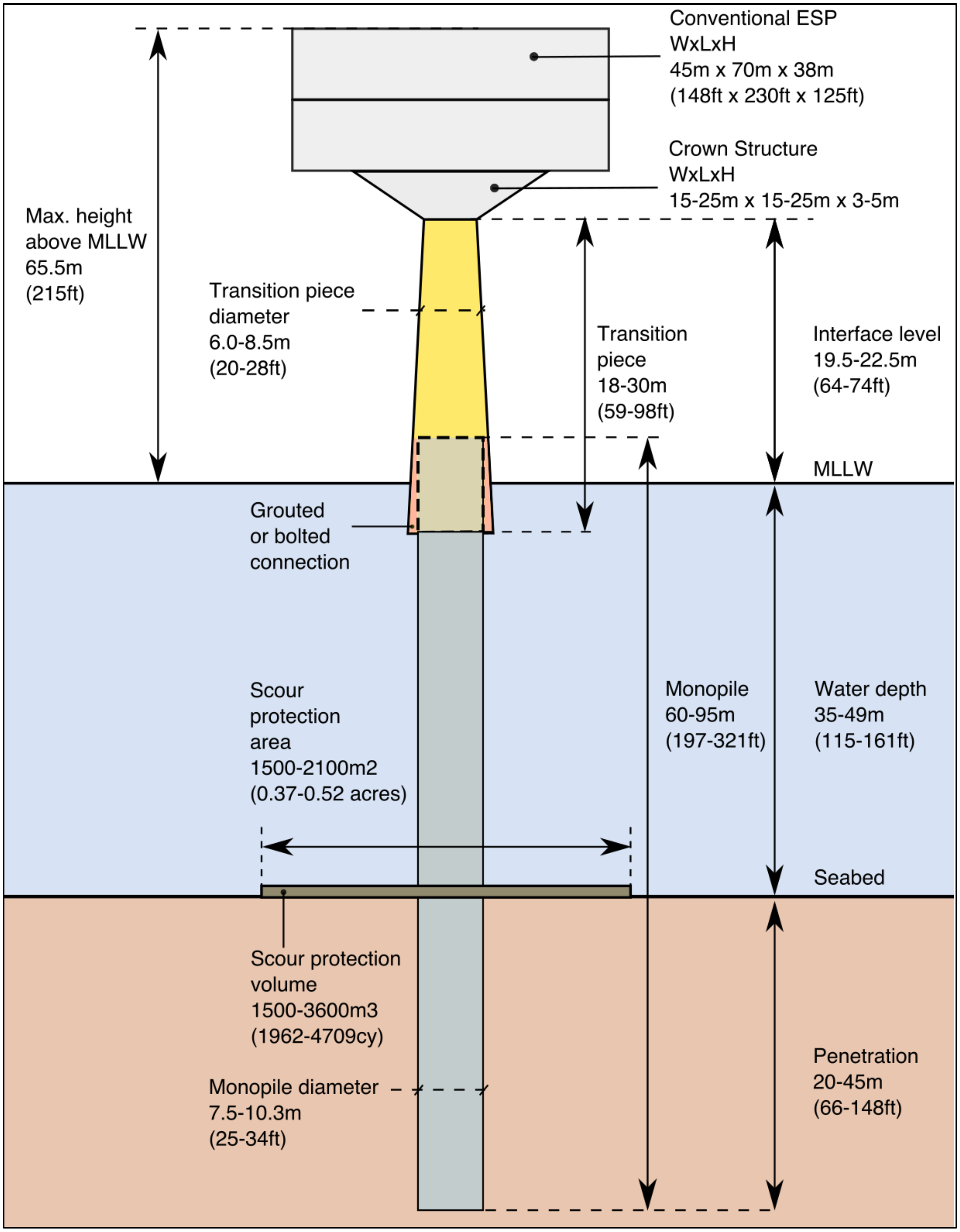
The SLVIA has two separate but linked parts: the seascape and landscape impact assessment (SLIA) and the visual impact assessment (VIA), as described in detail in BOEM's SLVIA guidance (Sullivan 2021). SLIA analyzes and evaluates impacts on both the physical elements and features that make up a landscape, seascape, or open ocean; and the aesthetic, perceptual, and experiential aspects of the landscape, seascape, or open ocean that make it distinctive. These impacts affect the "feel," "character," or "sense of place" of an area of landscape, seascape, or open ocean, rather than the composition of a view from a particular place. In SLIA, the impact receptors (the entities that are potentially affected by the proposed Project) are the seascape/open ocean/landscape itself and its components, both its physical features and its distinctive character.

VIA analyzes and evaluates the impacts on people of adding the proposed development to views from selected viewpoints. VIA evaluates the change to the composition of the view itself and assesses how the people who are likely to be at that viewpoint may be affected by the change to the view. Enjoyment of a particular view is dependent on the viewer; the impact receptors for VIA are people. The inclusion of both SLIA and VIA in the BOEM SLVIA methodology is consistent with BOEM's requirement under National Environmental Policy Act to consider all potentially significant impacts of development.




Source: COP Volume I, Figure 3.2-1; Epsilon 2022
ft = feet; m = meter; MLLW = mean lower low water

**Figure I-2: Proposed Project Maximum Wind Turbine Generator Size**

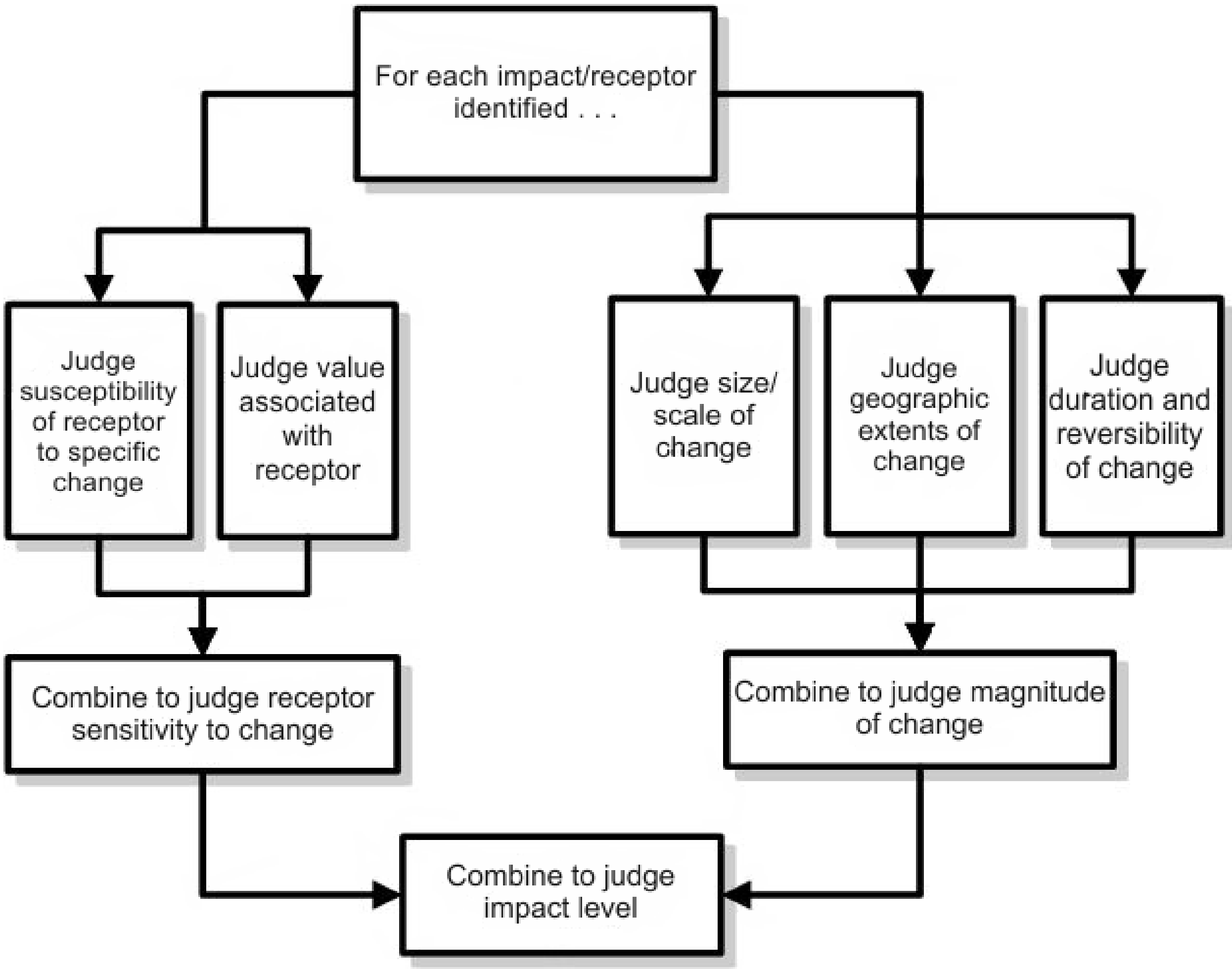



Source: COP Volume I, Figure 3.2-6; Epsilon 2022
ESP = electrical service platform; ft = feet; m = meter; m$^2$ = square meters; MLLW = mean lower low water; W×L×H = width × length × height

**Figure I-3: Proposed Project Maximum Electrical Service Platform Size**

The SLVIA methodology and parameters assessed consider local stakeholders' identity, culture, values, and issues, and their understanding of existing visual conditions. This SLVIA assesses the proposed Project's operations and maintenance (operations) stage against the environmental baseline. Table I-1 provides the impact levels used in this SLVIA.

The magnitude of effect in a seascape, open ocean, landscape, or view depends on the nature, scale, prominence, and visual contrast of the change and its experiential duration. Figure I-4 depicts this relationship, while Tables I-2 through I-4 summarize BOEM's recommended approach to determining ratings for sensitivity, magnitude, and impact for both SLIA and VIA. These tables are recommendations; some deviation is allowed based on "consideration of individual project circumstances" (Sullivan 2021).




Source: Sullivan 2021

**Figure I-4: Generalized Assessment Methodology for Seascape/Landscape and Visual Impacts**

**Table I-1: Definitions of Potential Adverse Impact Levels**

| Impact Level | Definition |
|---|---|
| Negligible | SLIA: Very little or no effect on seascape/landscape unit character, features, elements, or key qualities either because the unit lacks distinctive character, features, elements, or key qualities; values for these are low; or proposed Project visibility would be minimal.<br>VIA: Very little or no effect on viewers' visual experience because view value is low, viewers are relatively insensitive to view changes, or proposed Project visibility would be minimal. |
| Minor | SLIA: The proposed Project would introduce features that may have low to medium levels of visual prominence within the geographic area of an ocean/seascape/ landscape character unit. The proposed Project features may introduce a visual character that is slightly inconsistent with the character of the unit, which may have minor to medium negative effects on the unit's features, elements, or key qualities, but the unit's features, elements, or key qualities have low susceptibility or value.<br>VIA: Where viewer receptor sensitivity/susceptibility/value is low, the visibility of the proposed Project would introduce a small but noticeable to medium level of change to the view's character; have a low to medium level of visual prominence that attracts but may or may not hold the viewer's attention; and have a small to medium effect on the viewer's experience. If the value, susceptibility, and viewer concern for change is medium or high, the nature of the sensitivity is evaluated to determine if elevating the impact to the next level is justified. For instance, a KOP with a low magnitude of change but a high level of viewer concern (combination of susceptibility/value) may justify adjusting to a moderate level of impact. |
| Moderate | SLIA: The proposed Project would introduce features that would have medium to large levels of visual prominence within the geographic area of an ocean/seascape/landscape character unit. The proposed Project would introduce a visual character that is inconsistent with the character of the unit, which may have a moderate negative effect on the unit's features, elements, or key qualities. In areas affected by large magnitudes of change, the unit's features, elements, or key qualities have low susceptibility or value.<br>VIA: Where viewer receptor sensitivity/susceptibility/value is medium to low, the visibility of the proposed Project would introduce a moderate to large level of change to the view's character; may have moderate to large levels of visual prominence that attracts and holds but may or may not dominate the viewer's attention; and has a moderate effect on the viewer's visual experience. Moderate impacts are typically associated with medium viewer receptor sensitivity (combination of susceptibility/value) in areas where the view's character has medium levels of change, or low viewer receptor sensitivity (combination of susceptibility/value) in areas where the view's character has large changes to the character. If the value, susceptibility, and viewer concern for change is high, the nature of the sensitivity is evaluated to determine if elevating the impact to the next level is justified. |
| Major | SLIA: The proposed Project would introduce features that would have dominant levels of visual prominence within the geographic area of an ocean/seascape/landscape character unit. The proposed Project would introduce a visual character that is inconsistent with the character of the unit, which may have a major negative effect on the unit's features, elements, or key qualities. The concern for change (combination of susceptibility/value) to the character unit is high.<br>VIA: The visibility of the proposed Project would introduce a major level of character change to the view; attract, hold, and dominate the viewer's attention; and have a moderate to major effect on the viewer's visual experience. The viewer receptor sensitivity/susceptibility/value is medium to high. If the magnitude of change to the view's character is medium but the susceptibility or value at the KOP is high, the nature of the sensitivity is evaluated to determine if elevating the impact to major is justified. If the sensitivity (combination of susceptibility/value) at the KOP is low in an area where the magnitude of change is large, the nature of the sensitivity is evaluated to determine if lowering the impact to moderate is justified. |

KOP = key observation points; SLIA = seascape and landscape impact assessment; VIA = visual impact assessment

**Table I-2: Sensitivity Rating Matrix**

| | Susceptibility Rating | | |
|---|---|---|---|
| **Value Rating** | **High** | **Medium** | **Low** |
| High | High | High | Medium |
| Medium | High | Medium | Low |
| Low | Medium | Low | Low |

Source: Sullivan 2021

**Table I-3: Magnitude Rating Matrix**

| | Geographic Extent Rating | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Size and Scale Rating** | **Large** | **Large** | **Large** | **Medium** | **Medium** | **Medium** | **Small** | **Small** | **Small** |
| Large | Large | Large | Large | Large | Large | Medium | Large | Medium | Small |
| Medium | Large | Large | Medium | Medium | Medium | Small | Medium | Small | Small |
| Small | Large | Medium | Small | Medium | Small | Small | Small | Small | Small |
| | **Duration/Reversibility Rating** | | | | | | | | |
| | Poor | Fair | Good | Poor | Fair | Good | Poor | Fair | Good |

Source: Sullivan 2021

**Table I-4: Impact Rating Matrix**

| | Magnitude Rating | | |
|---|---|---|---|
| **Sensitivity Rating** | **Large** | **Medium** | **Small** |
| High | Major | Major | Moderate |
| Medium | Major | Moderate | Minor |
| Low | Moderate | Minor | Negligible[a] |

Source: Sullivan 2021

a Sullivan (2021) identifies the combination of low sensitivity with low magnitude as having "minor" impacts. For analysis of the proposed Project, the "negligible" rating (as defined in Table I-1) is more appropriate.

The SLVIA offshore geographic analysis area consists of the "zone of theoretical visibility"[1] and zone of visual influence (Construction and Operations Plan [COP] Appendix III-H.a; Epsilon 2022). This includes the SWDA, plus a 40-nautical-mile (46-mile) buffer. Beyond this distance, seascape, landscape, and visual effects from WTGs would likely be negligible (Sullivan 2021). Based on the Draft Environmental Impact Statement for the Ocean Wind Project in Lease Area OCS-A 0498), ESPs are likely to be visible from up to approximately 25 miles (BOEM 2022).

The map in Attachment I-1 shows areas on Martha's Vineyard and Nantucket where the proposed Project's WTGs would be theoretically visible, based on topography, vegetation, structures, and refraction of the earth's atmosphere. WTG visibility would vary throughout the day depending on view angle, sun angle, and atmospheric conditions. Visual contrast of WTGs would vary depending on the visual character of the horizon's backdrop and whether the WTGs are backlit, side-lit, or front-lit. For example, if less visual contrast is apparent in the morning hours, then visual contrast may be more pronounced in the afternoon. These effects would also be influenced by varying atmospheric conditions, direction of view, distance between the viewer and the WTGs, and elevation of the viewer. At distances of approximately 12 miles or closer, the WTGs form may be the dominant visual element creating visual contrast, regardless of color. At greater distances, color may become the dominant visual element creating visual contrast under certain visual conditions that gives visual definition to the WTG's form and line. The prevailing viewing direction from land within the zone of theoretical visibility would be to the south (from Martha's Vineyard) and southwest (from Nantucket and adjacent islands). All view directions are conceivable when viewing from a water vessel while at sea.

[1] Sullivan (2021) defines the zone of theoretical visibility as "the viewshed that results from ignoring all screening elements except topography." The applicant did not define a zone of theoretical visibility, but instead identified a "zone of visual influence" that identifies portions of the offshore geographic analysis area, where all or a portion of the nacelles for the proposed Project's WTGs would be visible above the horizon from land-based vantage points.

Depending on sun angle, time of day, and the presence of cloud cover, the backdrop sky color may have different intensities and hues. The visual interplay and contrast of the form, line, color, and texture of WTG components would vary with the changing character of the backdrop. For example, front-lit WTGs may have strong color contrast against a darker sky, giving definition to the WTG vertical form and line contrast to the ocean's horizontal character and the line where the sea meets sky. WTG components would be more likely to visually dissipate against a lighter sky backdrop. Variable cloudiness or passing clouds can change lighting conditions and effects, placing some WTGs in the shadow and making them appear darker and less conspicuous while highlighting others with a bright color contrast. The level of noticeability would be directly proportional to the degree of visual contrast and scale of change between the WTGs and the backdrop.

Landfall sites, offshore export cable routes, and grid interconnection cables would be installed entirely underground within road and existing utility rights-of-way and would not be visible once construction is complete. As a result, these components are not evaluated. The applicant did not prepare a viewshed map for construction and installation (construction), operations, and conceptual decommissioning (decommissioning) of the Phase 1 onshore substation sites at 6 and 8 Shootflying Hill Road and at Parcel #214-001 adjacent to the existing West Barnstable Substation (COP Appendix III-H.a; Epsilon 2022). The COP (Appendix III-H.a; Epsilon 2022) includes simulations of the substation from various locations with and without potential future vegetative screening added by the applicant. The location of the Phase 2 onshore substation (if the Phase 1 substation location cannot be used for Phase 2) has not been identified (COP Appendix III-H.a; Epsilon 2022). The onshore geographic analysis area includes areas potentially within view of the Phase 1 onshore substation, based on BOEM's generalized understanding of topography and vegetation.

In addition to identifying a zone of visual influence rather than a zone of theoretical visibility (as described above), the applicant's evaluation of the proposed Project's visual impacts did not fully implement BOEM's SLVIA methodology. Specifically, the applicant defined seascape, open ocean, and landscape "units" rather than character areas, and did not calculate the geographic extent of those units or the geographic extent of the proposed Project's visibility within those units. This appendix applies the SLVIA methodology to the proposed Project and other offshore wind projects in the RI/MA Lease Areas to the degree possible, based on information provided in the applicant's COP (Volume III, Section 7.4 and Appendix III-H.a; Epsilon 2022).

## I.3 Existing Seascape, Landscape, and Visual Character

### I.3.1 Overview

Martha's Vineyard and Nantucket were formed by the last period of continental glaciation and the rise in sea level that followed. This created islands that are generally characterized by low elevations, with undulating hills and shallow depressions. Elevations range from sea level to an average of approximately 110 feet above mean sea level (AMSL), with specific locations rising above 200 feet AMSL. Most of the oceanfront on these islands is fringed by barrier beaches and sand dunes. The western and northwestern parts of Martha's Vineyard are marked by ridges and hills that extend southwesterly and end at the high cliffs of Aquinnah (Gay Head), Nashaquitsa, and Squibnocket. The elevation of these hills averages approximately 200 feet AMSL but extends as high as 300 feet AMSL in some areas (COP Appendix III-H.a; Epsilon 2022).

The overall aesthetic character of Martha's Vineyard and Nantucket can generally be described as small-town landscapes with minimal urban development. Vegetation is characterized by a mix of scrub forest, upland heaths, sand plain grasslands, salt marshes, and open fields (agricultural and successional). Developed features include village centers, year-round and vacation homes, roads, and harbors/ports.

The horizon looking south toward the SWDA from the various coasts is typically defined by a view of the open ocean. Development and infrastructure at some of the viewpoints includes artificial lighting, which results in some light pollution; however, most daytime and nighttime views are typical of beaches and natural areas with little development. Lights from vessels can be seen from all coastal locations along the ocean horizon on most nights except in foggy conditions (COP Appendix III-H.a; Epsilon 2022).

Proposed Project visibility factors—the "variables affecting the actual visibility of an object in the landscape" or seascape (Sullivan 2021) can vary from day to day and throughout a single day. These factors include viewer characteristics, viewshed limiting factors (e.g., topographic and vegetative screening), lighting (e.g., weather and sun position), atmospheric conditions, viewing angles, the viewing backdrop, and the visual characteristics of the objects being viewed (e.g., size, scale, color, form, line, texture, and motion) (Sullivan 2021). BOEM conducted a meteorological study in 2017 to assess typical visibility conditions near the RI/MA Lease Areas at varying distances (BOEM 2017). Table I-5 summarizes these data at the Nantucket and Martha's Vineyard airports; however, the BOEM meteorological study did not assess or address visibility of WTGs, and Table I-5 does not imply that the proposed Project's WTGs would or would not be visible beyond the average visibility distances.

Atmospheric conditions offshore and near the shoreline limit views more than the typically drier-air conditions in inland areas. Visual simulations from representative viewpoints included in Attachment I-2 indicate that the proposed Project's WTGs and in some cases ESPs would be visible to the casual observer from beach viewpoints. The minimum distances from observers on land to the closest proposed Project WTG would be approximately 21.3 miles at Squibnocket Point on the southwestern tip of Martha's Vineyard and 25.2 miles at Madaket Beach on Nantucket.

**Table I-5: Visibility Conditions at the Nantucket and Martha's Vineyard Airports, 2017**

| Measure of Visibility | Martha's Vineyard Airport | Nantucket Airport |
|---|---|---|
| Average visibility distance in clear conditions | 20 nautical miles (23 miles) | 17 nautical miles (20 miles) |
| Number of days when visibility extends to 20 nautical miles (23 miles) for 50% or more of daylight hours | 113 days/year | 80 days/year |
| Days when visibility extends to 30 nautical miles (34.5 miles) for 50% or more of daylight hours | 32 days/year | 14 days/year |

Source: BOEM 2017

### I.3.2 Seascape, Open Ocean, and Landscape

Whereas BOEM's SLIA methodology (Sullivan 2021) includes identification of landscape character areas and seascape character areas (in addition to the open ocean), the applicant classified the geographic analysis area according to "landscape units," defined as "areas with common characteristics of landform, water resources, vegetation, land use, and land use intensity…a landscape unit is a relatively homogenous, unified landscape (or seascape) of visual character. Landscape units are established to provide a framework for comparing and prioritizing the differing visual quality and sensitivity of visual resources" (COP Appendix III-H.a, Section 2.1; Epsilon 2022).[2] Table I-6 defines the landscape units (which also include ocean and shoreline areas).

[2] BOEM has determined that, while the applicant's visual analysis did not follow the SLVIA guidance (Sullivan 2021), the applicant's information was sufficient to support analysis of seascape, landscape, and visual impacts for the proposed Project.

**Table I-6: Seascape, Open Ocean, and Landscape Units within the Geographic Analysis Area**

| Seascape Units | Description |
|---|---|
| Ocean Beach Unit | Miles of sand beaches are a defining aesthetic feature of Martha's Vineyard, Nantucket, and Cape Cod. Beaches are a significant attraction for sunbathers, surfers, fishermen, and beachcombers. During the summer season, certain stretches of the beach setting are at capacity. At other times of the year, beaches can be nearly deserted and appear in a seemingly pristine natural condition. As a daytime destination, visitors bring brightly colored umbrellas, coolers, folding chairs, towels, and recreational watercraft. Southerly views from the beach encompass views of the open water landscape across the Open Ocean Unit.<br><br>The beaches are both sandy (primarily on Nantucket, along the south coast of Cape Cod, the perimeters of the Elizabeth Islands, and the eastern portion of Martha's Vineyard) and rocky (primarily on the western portion of Martha's Vineyard). Breaking surf is a continuous and unique visual condition. Viewer activity is primarily recreational in nature including passive sunbathing, swimming, walking/beach combing, surf fishing, and surfing. Beaches are also used by recreational and commercial fishermen.<br><br>Views are almost always unobstructed and considered highly scenic. Views extend up and down the coast and across open water as one looks out to sea. Inland views include grassy dunes and coastal scrub vegetation. Man-made structures are frequently visible from beach locations, although extended stretches of beachfront on Martha's Vineyard and Nantucket are located within protected open space areas with little to no man-made development within immediate view. |
| Coastal Bluff Unit | Portions of the coastal area are defined by a distinctive topographic rise in elevation from the beach below, with coastal scrub vegetation at the top of the bluffs. Dramatic coastal bluffs occur at the eastern end of Martha's Vineyard at Gay Head, Aquinnah, and Chilmark where the land rises steeply from sand or rocky beaches to elevation of 30 meters (100 feet) or more. Notable bluffs in this area include Gay Head Cliffs, Zacks Cliffs, Squibnocket Ridge, Nashaquitsa Cliffs, and Wequobsque Cliffs. Less dramatic bluffs are found at Wasque Point at the southern end of Chappaquiddick Island where topography steeply rises 15-30 meters (50-100 feet) above beach elevation.<br><br>The Coastal Bluff Unit is defined by scenic open vistas of the ocean and distant landscape from an elevated vantage point. Viewers frequently visit these areas specifically to enjoy scenic vistas over the ocean and long-distance views up and down the coastline. Bluff vistas also commonly include man-made development including roads and vehicles, overhead utility lines, and residential development. |
| **Open Ocean Unit** | |
| Open Ocean Unit | The Open Ocean Unit includes the open water of the Atlantic Ocean, Nantucket Sound, Vineyard Sound, Buzzards Bay, and Rhode Island Sound more than 3 nautical miles (3.5 miles) from shore. This unit is characterized by broad expanses of open water that forms the dominant foreground element in all directions. From all vantage points, the proposed Project will be viewed over open water. In general, the waters of the Atlantic Ocean appear dark bluish-gray typical of northeastern U.S. oceanic water (as compared to the light greenish blue colors common to southeastern waters of the U.S.). Cloud cover, wind, sun reflectance, and surface glare affect the color of the water and often create patterns of color variation over the water surface. The visible texture of the water is affected by the action of waves, which can include flat water, rolling swells, and/or choppy white cap conditions. These factors contribute to an amalgam of shimmering colors and patterns of light that are of aesthetic interest and may command the attention of observers.<br><br>The waters off Cape Cod, Martha's Vineyard, and Nantucket support a wide variety of human activities including water sports, recreational boating (sail and power craft), recreational and commercial fishing, ferry services, and commercial shipping, among others uses. Navigation through the area includes ocean-going vessels headed to or from major ports (e.g., New York and Boston), commercial fishing vessels, ferry transport (Nantucket and Martha's Vineyard ferries), pleasure craft, and sport fishing boats. The ocean, sound, channels, harbors, and bays are marked with maritime aids (e.g., buoys, channel markers, warning lights). |

| **Seascape Units** | **Description** |
|---|---|
| **Landscape Units** | |
| Coastal Dunes Unit | The inland edge of the Ocean Beach Unit is defined by undulating sand dunes typically ranging in height from 3-6 meters (10-20 feet). Dunes are typically vegetated with low grasses and low shrubs. Coastal dunes typically occur along the shoreline between the ocean beaches and more inland landforms and are present throughout the study area on Cape Cod, especially in the easterly limit of the proposed APE, as well as on Martha's Vineyard and Nantucket. The dunes are typically traversed by narrow enclosed footpaths through the beach grass that provide public access to the beaches from inland roads and parking areas. Ocean views from the back side of the Coastal Dune Unit are largely restricted by the dune terrain. Viewer activity is almost exclusively recreational, focused on walking/sight-seeing and beach access from inland roads and parking areas. |
| Salt Pond/Tidal Marsh Unit | Salt ponds and tidal marshes inland of the Ocean Beach Unit are common throughout the coastal area. Disconnected from the ocean except during flooding events, or connected to the ocean by narrow tidal channels, these water features are defined by shallow open water and buffered by herbaceous grasses and other salt-tolerant vegetation. In those with hydraulic connections to the ocean, water levels rise and fall with the tide, exposing mud flats. Views over the water body and flat marshland extend until interrupted by adjacent dunes and/or scrub vegetation. Residences often are present along the edges of the ponds, many with associated docks and boats. Recreational activities in this unit include walking, boating, clam digging, and bird watching. |
| Coastal Scrub Brush Unit | At varying distances inland from the Coastal Beach, Coastal Dunes, and Salt Pond/Tidal Marsh units, the coastal landscape transitions into a more heavily vegetated scrub brush and low forest condition. The Coastal Scrub Brush Unit (and the Forest Unit described below) is characterized by low dense woody and herbaceous vegetation—the dominant forest is Pitch Pine-Oak forest, which occurs on Cape Cod, Martha's Vineyard, and Nantucket. Scrub vegetation is commonly found on upland dunes and plains above tidal conditions. Landform is often comprised of small hills and eroded hollows. Vegetation is often thick and nearly impenetrable, and views are frequently obstructed by dense foliage. Distant vistas may be limited to view corridors along roadways or where scrub brush transitions to open meadow. Viewer activity is typically limited to local travel and recreational use, such as walking and biking. |
| Forest Unit | Inland from various coastal units are extended wooded areas including both deciduous and coniferous species (e.g., oaks, hickories, and white pine). The understory is comprised of mixed shrubs, vines, and saplings. In areas exposed to coastal winds, trees are often irregular in form and stunted; trees located in better shielded inland areas are taller and more regular in form. Although this landscape type once dominated the interior of Martha's Vineyard, Nantucket, and Cape Cod, various forms of human development extensively encroach upon this area, and only a patchwork of mature forest remains. A variety of land use activities exist in the Forest Unit, including residential development, roads, small open yards and fields, and other land uses. Such conditions are not specifically identified as separate units due to the visual dominance of the surrounding forest. Topography in the Forest Unit is typically level to rolling with distinct ridges and gullies. Views are frequently restricted to openings in the forest canopy and axial views along roadways. Viewer activity includes residential uses and local travel. Recreational uses include walking and bicycling through the woods along local roads and trails. |
| Shoreline Residential Unit | Shoreline (or near shoreline) residential development is common in coastal areas not currently protected by public and private land conservation initiatives. Residential development ranges from small bungalow-style beach houses to large well-maintained vacation homes. The developments are a mix of densely developed areas, such as Falmouth Heights and Popponnesett (Mashpee) and Nantucket harbor, and low-density developments on the south shores of Martha's Vineyard and Nantucket. Although sometimes screened by coastal scrub vegetation, shoreline residences typically have panoramic views of the ocean, salt ponds/tidal marshes, and/or dune landscape. Architecture is a mixture of old and new construction and traditional/historic and contemporary styles. The local landscape is gently rolling with a mix of coastal scrub, heath, and dunes surrounding maintained residential landscapes. Larger trees are generally not present in beachfront locations. Shoreline residential homes are often used seasonally by owners or offered as vacation rentals. Visitors to these properties enjoy views of the ocean or beachfront landscape and frequently walk or drive from the residential property to the beach and other scenic coastal locations as part of their vacation routine. |

| Seascape Units | Description |
|---|---|
| Village/Town Center Unit | The Village/Town Center Unit includes clearly identifiable population centers including Vineyard Haven, Oak Bluffs, and Edgartown on Martha's Vineyard; Woods Hole and West Falmouth on Cape Cod; and Nantucket Village on Nantucket. This zone is comprised of moderate to high density residential and commercial development in a village setting. Vegetation most commonly includes street trees and residential landscaping yard trees. Buildings (typically two to three stories tall) and other man-made features dominate the landscape. Architecture is highly variable in size, style, and arrangement. Each town center on Martha's Vineyard and Nantucket maintains an individual and distinctive New England character. Village/town centers are widely recognized as quaint small town destinations and highly scenic places.<br><br>On Martha's Vineyard and Nantucket, village and town centers are small coastal seaports with clusters of historic buildings focused around clearly defined and thriving downtown commercial districts. Side streets are characterized by well-maintained residential structures adjacent to the village center. Buildings are most commonly of a traditional New England architectural style and arranged in an organized pattern focusing views along the streets. Buildings, street trees, and local landscaping enclose and prevent long-distance views. |
| Rural Residential Unit | The Rural Residential Unit is found along the frontage of rural roads through Cape Cod, Martha's Vineyard, and Nantucket, outside of the Village/Town Center Unit and the Suburban Residential Unit and inland from coastal areas. Structures are typically single family homes that vary widely in age and architectural style, from the traditional Cape style house to modern modular homes and historic farm houses. Residences tend to be larger and well-maintained, often with a traditional New England character. Rural residences on Cape Cod vary in size from small Cape or ranch style homes to larger farm houses, and are generally located on paved roads. On Martha's Vineyard and Nantucket, the older homes vary in size, while newer seasonal homes are larger estates and located on large lots. Many rural roads on the islands are unpaved. Residential structures are often set back from the road and interspersed with hedgerows and small woodlots. Topography is characterized by relatively level to gently rolling landform typical of inland on Martha's Vineyard and Nantucket. Extended distance views are often restricted to open fields and axial views along residential uses are not typically oriented toward ocean views. Viewer activity includes common residential uses, recreation, and local travel. |
| Suburban Residential Unit | Suburban residential development includes medium- to high density single family residential neighborhoods that typically occur on the outskirts of villages and town centers, along secondary roads and cul-de-sacs. The Suburban Residential Unit is most commonly located on Cape Cod and around the perimeter of Village/Town Center Units on Martha's Vineyard and Nantucket. Buildings are most often one- and two-story wood framed structures with peaked roofs and clapboard or shingle siding. House styles are primarily capes, ranches, bungalows, salt boxes, and colonial residential structures.<br><br>Suburban Residential Units are also found in coastal areas in relatively new clusters of homes designed for year-round, seasonal, or vacation use in areas proximate to beaches and other scenic and recreational resources. Suburban residential developments generally have regularly spaced homes surrounded by landscaped yards. Residential subdivisions are commonly located within forest areas or have pockets of remnant forest vegetation within developed areas. Streets are well-organized in layout, and are often curvilinear in form with well-defined access to collector streets. Activities include normal residential uses and local travel. Views are often limited by surrounding vegetation or adjacent structures. Suburban Residential Units are not typically oriented toward ocean views. |
| Agricultural/Open Field Unit | Agricultural land uses within the APE are limited to several small, generally level to gently sloping pastures and crop fields. Livestock and working farm equipment add to the visual interest of the open fields. This unit occurs primarily in inland portions of the APE as a minor component of the landscape on both Martha's Vineyard and Nantucket. Many of the agricultural landscapes are protected open space, either by public agencies, private land trusts, or non-profit organizations. Agricultural lands may offer long-distance views. Adjacent forest, coastal scrub, and structures commonly frame/enclose views and provide significant screening. Because this unit largely inland, views to the ocean are relatively rare, with the exception of Bartlett's Farm on Nantucket and the Allen Farm on Martha's Vineyard. |

Source: COP Appendix III-H.a; Epsilon 2022

APE = area of potential effects

### I.3.3 Key Observation Points and Simulations

The applicant identified 21 key observation points (KOP) on Martha's Vineyard and Nantucket to evaluate the potential visual and scenic impacts of the proposed Project (KOPs 1 to 21 in Table I-7). The KOPs for the proposed Project, which included many of the KOPs identified for and evaluated as part of the Final Environmental Impact Statement for Vineyard Wind 1 (BOEM 2021), were selected to be representative of important individual resources and the diverse views of the proposed Project available from Martha's Vineyard and Nantucket. The KOPs were identified to avoid (to the degree possible) duplication of similar views, seascape or landscape units, and distances to the nearest WTG (John McCarty, Pers. Comm., May 18, 2022). In addition to the 21 KOPs identified by the applicant, KOP 22 represents a theoretical observer on a vessel offshore (not at any specific location) between the southern coasts of Martha's Vineyard or Nantucket and the SWDA. KOPs 23 through 25 were not listed in the COP (Appendix III-H.a; Epsilon 2022) as KOPs but provide potential views of the Phase 1 onshore substation and are thus included as KOPs in this analysis. Because KOPs 23 through 25 have no views of WTGs or ESPs, this appendix does not further evaluate visual impacts from these viewpoints.

Table I-7 lists the KOPs and the corresponding seascape, open ocean, and landscape units; representative resource types; the type of simulation prepared by the applicant; and distance to the nearest proposed Project WTG. Based on discussions with BOEM, the applicant prepared full panoramic simulations (124 by 55-degree FOV) from six KOPs, and single-frame photographic simulations from three additional KOPs (COP Appendix III-H.a; Epsilon 2022). The remainder of this appendix focuses on the KOPs for which simulations were prepared (i.e., KOPs 1 through 8 and 21) and the theoretical offshore viewer represented by KOP 22.

**Table I-7: Key Observation Points**

| KOP | Seascape, Open Ocean, and Landscape Units | Resource Types | Simulation Type | Distance to Closest WTG (miles) |
|---|---|---|---|---|
| 1. Aquinnah Cultural Center | Coastal Bluff | National Natural Landmark, National Register of Historic Places | Panoramic | 25.4 |
| 2. Long Point Beach | Ocean Beach, Coastal Dunes, Salt Pond/Tidal Marsh | Wildlife Refuge, Recreation, Historic Resources | Single Frame | 22.8 |
| 3. South Beach | Ocean Beach, Coastal Dunes | Recreation | Panoramic | 23.1 |
| 4. Wasque Reservation | Ocean Bluffs, Coastal Bluff, Forest | Recreation, Open Space, Conservation | Panoramic | 24.1 |
| 5. Madaket Beach | Ocean Beach, Coastal Dunes, Shoreline Residential | Recreation, Historic Resources | Panoramic | 25.1 |
| 6. Miacomet Beach and Pond | Ocean Beach, Coastal Dunes, Salt Pond/Tidal Marsh | Recreation, Historic Resources | Single Frame | 26.8 |
| 7. Bartlett's Farm | Agriculture/Open Field | Historic Resources | Single Frame | 26.9 |
| 8. Tom Nevers Field | Coastal Bluff, Coastal Scrub, Maintained Recreation | Recreation | Panoramic | 30.9 |
| 9. Gay Head Cliffs Overlook | Coastal Bluff | National Natural Landmark, National Register of Historic Places | None | 25.5 |
| 10. Gay Head Lighthouse | Coastal Bluff | National Natural Landmark, National Register of Historic Places | None | 25.5 |
| 11. Squibnocket Beach | Ocean Beach | Recreation, Historic Resources | None | 22.2 |
| 12. Lucy Vincent Beach | Ocean Beach, Coastal Dunes | Recreation, Historic Resources | None | 22.9 |
| 13. Barn House/Skiff-Mayhew-Vincent House | Agriculture/Open Field | National Register of Historic Places | None | 23.1 |
| 14. Chappy Point, Gardner Beach | Village/Town Center | Recreation, Historic Resources | None | 26.3 |
| 15. Cisco Beach | Ocean Beach, Coastal Dunes, Salt Pond/Tidal Marsh | Recreation | None | 26.0 |
| 16. Surfside Beach | Ocean Beach, Coastal Dunes | Recreation, Historic Resources | None | 28.0 |
| 17. Nobadeer Beach Pond Road | Ocean Beach, Coastal Dunes | Recreation, Historic Resources | None | 28.4 |
| 18. Green Point Lighthouse | Ocean Beach, Coastal Dunes | National Register of Historic Places, Recreation | None | 36.5 |
| 19. Rock Landing | Ocean Beach, Coastal Bluff | National Register of Historic Places, Recreation | None | 38.1 |
| 20. Dowse's Beach | Ocean Beach, Coastal Dunes | National Register of Historic Places, Recreation | None | 43.4 |
| 21. Peaked Hill Reservation | Coastal Scrub Brush, Forest | Recreation | Panoramic | 24.2 |

| KOP | Seascape, Open Ocean, and Landscape Units | Resource Types | Simulation Type | Distance to Closest WTG (miles) |
|---|---|---|---|---|
| 22. Representative Offshore View | Open Ocean | Recreation | None | Varies |
| 23. Shootflying Hill Road (Existing Hotel) | Village/Town Center | Commercial | Single Frame | NA |
| 24. Shootflying Hill Road (Right-of-Way #343) | Coastal Scrub Brush, Forest | Utility Infrastructure | Single Frame | NA |
| 25. Exit 6 Park and Ride/ Highway Rest Area | Village/Town Center | Commercial | Single Frame | NA |

Source: COP Appendix III-H.a, Tables 8 and 9; Epsilon 2022

KOP = key observation point; NA = not applicable (KOPs focused on Phase 1 onshore substation); WTG = wind turbine generator

## I.4 Results

This section discusses the characteristics of the proposed Project that would contribute to seascape and landscape impacts, as well as visual impacts. Alternative C, Habitat Impact Minimization Alternative, would not affect the number, placement, or other characteristics of WTGs, ESPs, or onshore components of the proposed Project. Therefore, only Alternative B, Proposed Action, is evaluated in this SLVIA.

### I.4.1 Proposed Project Elements

Table I-8 lists the noticeable daytime and nighttime elements of the proposed Project's WTGs and ESPs. Each WTG would have two L-864 flashing red obstruction lights on the top of the nacelle. WTGs would have at least three additional intermediate lighting on the tower using low-intensity red flashing (L-810) obstruction lights on the tower approximately midway between the top of the nacelle and the surface of the water (COP Volume I, Section 3.2.1; Epsilon 2022). All obstruction lights would use an aircraft detection lighting system (ADLS). ADLS would only activate Federal Aviation Administration hazard lighting when aircraft enter a predefined airspace; studies for the proposed Project assumed a horizontal buffer of 3 nautical miles (4.1 miles) and a vertical buffer of 3,500 feet from any WTG (COP Appendix III-K; Epsilon 2022). Under these parameters, ADLS would be activated for the proposed Project less than 13 minutes per year, substantially less than 0.1 percent of annual nighttime conditions (COP Appendix III-K; Epsilon 2022).

**Table I-8: Heights of Noticeable Wind Turbine Generator and Electrical Service Platform Elements**

| Element | Height in Feet (MLLW) |
|---|---|
| WTG rotor blade tip at maximum vertical extension | 1,171 |
| Federal Aviation Administration hazard light (top of nacelle) | 725 |
| Hub | 702 |
| Mid-tower lights (approximate height) | 363 |
| ESP lights (maximum height of ESP topside) | 230 |
| Navigation Light (WTG and ESP) | 148 |
| Yellow Foundation Base Color (WTG and ESP) | 148 |

ESP = electrical service platform; MLLW = mean lower low water; WTG = wind turbine generator

### I.4.2 Seascape and Landscape Impact Assessment

Table I-9 summarizes the noticeable proposed Project elements within each seascape, open ocean, and landscape unit. The horizontal FOV from any single viewpoint within a seascape, open ocean, or landscape unit can vary based on the location. In analyzing the seascape and landscape impact of the Ocean Wind Project, BOEM grouped visibility characteristics of WTGs similar in size to those included in the proposed Project by distance as follows (BOEM 2022):

- 0 to 5 miles from the observer: unavoidably dominant features in the view;
- 5 to 12 miles from the observer: strongly pervasive features between;
- 12 to 28 miles from the observer: clearly visible features;
- 28 to 31 miles from the observer: low on the horizon, but persistent features; and
- 31 to 40 miles: intermittently noticed features.

Impacts on high-sensitivity seascape and open ocean character would be major. The daytime and nighttime (lighting) presence of the WTGs, ESPs, and construction and operations vessel traffic would change perception of this area from natural, undeveloped seascape to a developed wind energy environment characterized by visually dominant WTGs and ESPs.

**Table I-9: Proposed Project Noticeable Elements by Seascape, Open Ocean, and Landscape Unit**

| Seascape, Open Ocean, and Landscape Unit | Noticeable Elements[a, b] |
|---|---|
| Ocean Beach | B, E, N, OL, T |
| Coastal Bluff | B, E, N, OL, T |
| Open Ocean[b] | B, E, N, NL, OL, T, Y |
| Coastal Dunes | B, E, N, OL, T |
| Salt Pond/Tidal Marsh | B, E, N, OL, T |
| Coastal Scrub Brush | B, E, N, OL, T |
| Forest | B, OL, T, S |
| Shoreline Residential | B, E, N, OL, T |
| Village/Town Center | B, OL, T, S |
| Rural Residential | B, OL, T |
| Suburban Residential | B, OL, T, S |
| Agricultural/Open Field | B, OL, T |

ADLS = aircraft detection lighting system; B = WTG blades; E = electrical service platform; N = nacelle; NL = navigation light; OL = nacelle-top obstruction lights; S = Phase 1 onshore substation; T = WTG tower; WTG = wind turbine generator; Y = yellow foundation transition piece

[a] Impacts of nacelle-top obstruction lights and mid-tower lights would be negligible until the ADLS activates nacelle-top and mid-tower obstruction lights.

[b] Noticeable elements from the Open Ocean Unit would vary based on the location relative to the offshore wind projects. Based on the likely sizes of WTGs (Table I-8), all elements of an individual WTG would be visible within approximately 14.6 miles of that WTG position (COP Appendix III-H.a, Section 3.2; Epsilon 2022).

Maintenance activities would cause minor effects on seascape character due to increased operations vessel traffic to and from the SWDA. Increased vessel activity would be noticeable to offshore viewers but would be indistinguishable from most other offshore vessel activity, and thus would not have a significant visual effect. Decommissioning would involve the removal of all offshore structures and is expected to follow the reverse of the construction activity. Decommissioning activities would therefore cause visual effects similar to those of construction activities but of shorter duration.

Viewshed analyses (COP Appendix III-H.a; Epsilon 2022) determined that clear-weather visibility of the WTG blade tips would potentially occur from approximately 3,004 acres on Martha’s Vineyard (about

2.8 percent of the island's land area) and approximately 4,062 acres on Nantucket and associated islands (7.3 percent of the land area of those islands). The proposed Project would be most frequently visible along south-facing shorelines and south-facing elevated areas of Martha's Vineyard and Nantucket. WTG blades in motion would be more readily perceptible than static elements such as WTG towers and would, thus, be more easily noticed at greater distances than towers.

When ADLS is not activated (all but a few minutes per year), there would be no nighttime lighting impacts. When activated by ADLS, nighttime lighting of proposed Project WTGs would have major nighttime impacts resulting from continuously flashing lights, the sky light dome, and reflections on clouds during those limited times. U.S. Coast Guard-required navigation warning lights would be mounted at the top of the foundation for each WTG and ESP, at an elevation of no more than 148 feet MLLW (COP Section 3.2.1, Volume I; Epsilon 2022). The lighting is designed to be visible to at least 5 nautical miles (5.8 miles) during low visibility conditions and would be visible from further away under clear conditions (COP Appendix III H.a; Epsilon 2022). This lighting could be visible to observers in elevated locations onshore in clear conditions. Lights on ESPs, when lit for maintenance, would potentially be visible from beaches and adjoining land and built environment during hours of darkness. The nighttime sky light dome and cloud lighting caused by reflections from the water surface may be seen even if individual lights are not visible, depending on variable ocean surface and meteorological reflectivity.

Due to its location, the Phase 1 onshore substation would not affect Open Ocean or Seascape units and would only affect a limited area within portions of the Forest Unit, Village/Town Center Unit (in and around the U.S. Route 6 Rest Area), and Suburban Residential units, all of which have low sensitivity to change. The substation would cause minor effects on landscape character in these units. While substation infrastructure would be distinct and could differ in character from typical suburban development, it would typically be visible among other human-made structures such as roads, commercial structures (at the rest stop), and existing electrical transmission line corridors.

In summary, SLIA considers impacts on the physical elements and features that make up a seascape, open ocean, or landscape and the aesthetic, perceptual, and experiential aspects of the seascape, open ocean, or landscape that contribute to its distinctive character. These impacts affect the "feel," "character," or "sense of place" of an area of seascape, open ocean, or landscape. Table I-10 summarizes the effects of the proposed Project's visible elements on the aspects that contribute to the distinctive character of the seascape, open ocean, and landscape areas from which the proposed Project would be visible.

### I.4.3 Visual Impact Assessment

Visibility, character-changing effects, and visual contrasts reduce steadily with distance from the observation point. Visibility, character-changing effects, scale, prominence, and visual contrasts increase with elevated observer position relative to the proposed Project. Distance and observer elevation considerations are informed by the VIA simulations (COP Appendix III-H.a; Epsilon 2022) and the horizontal FOV. The horizontal FOV occupied by the proposed Project is defined as the extent of the visible horizon the project occupies as seen from a specified location, usually measured in degrees. Table I-11 provides horizontal FOVs for selected KOPs (Attachment I-3 provides maps documenting these view angles). Typical human perception extends to 124 degrees in the horizontal axis. The applicant did not provide an estimate of the percentage of the vertical FOV (approximately 55 degrees for human perception) occupied by proposed Project WTGs on the horizon; however, based on the analysis of the Ocean Wind Project, WTGs are likely to occupy less than 1 percent of the vertical FOV (BOEM 2022).

To support the VIA for the proposed Project, three Environmental Resources Management visual resource subject matter experts reviewed the simulations and applied a visibility rating system (Sullivan et al. 2012; Table I-12) to assess the visibility of the proposed Project (as well as other offshore wind projects, as described in Section I.4.4), based on the applicant's simulations, assuming clear conditions. The subject matter experts reviewed each simulation, assigned a rating, and reviewed as a group to reach consensus.

Table I-13 lists key proposed Project characteristics and visual contrasts from each KOP. The analysis considers the introduction of WTGs and ESPs to an open ocean baseline. The scale, size, contrast, and prominence of change focuses on the:

- Arrangement of WTGs and ESPs in the view;
- Horizontal FOV scale of the proposed Project WTG array (as well as the vertical FOV scale, which was not calculated by the applicant);
- Position of the array in the open ocean;
- Position of the array in the view, including the extent of natural or human-made elements in the foreground, such as vegetation or structures;
- WTG blade motion; and
- The array's distance from the viewer.

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**Table I-10: Seascape, Open Ocean, and Landscape Character and Impact Levels**

| Seascape, Open Ocean, or Landscape Unit | Receptor Sensitivity | | | Impact Magnitude[a] | | | |
|---|---|---|---|---|---|---|---|
| | Susceptibility and Rationale | Value and Rationale | Sensitivity and Rationale | Geographic Extent | Size and Scale and Rationale | Magnitude and Rationale | SLIA Impact Level and Rationale |
| Ocean Beach | High<br>Views are considered highly scenic. They are concentrated out to sea with secondary views extending up and down the coast and across open water. Inland views include grassy dunes, coastal scrub vegetation, and human-made structures. Extended stretches of beachfront on Martha's Vineyard and Nantucket are located within protected open space areas with little to no development within the view. This unit abuts and is adjacent to multiple other units, creating unique edge conditions. | High<br>Part of the unit is located within a National Seashore and contains elements listed on or eligible for the National Register of Historic Places. It contains large tracts of apparently undisturbed land valued for recreation. It is heavily visited during peak season with few opportunities for solitude, while the opposite occurs during off season with a seemingly unending expanse of untouched natural area. | High<br>There is importance placed on beachfronts by residents and visitors, as well as the presence of multiple special designation areas. | Large<br>There is a large, linear area within this unit with unobstructed views of the proposed Project area. | Medium<br>The proposed Project would add human-made elements visible from portions of the unit that currently have unobstructed ocean views; however, signs of human intervention surround the open and otherwise undisturbed ocean view. The visible extent of human influence varies by season and exact location. | Medium<br>The proposed Project would affect a small portion of the overall geographic area of the unit and would be small in scale where visible but would be distinctly different from the unobstructed ocean horizon. | **Major**<br>The scale and size of the proposed Project would make it a minor element in the large geographic extent of the overall unit. However, the Ocean Beach Unit is highly sensitive. Although some views within this unit have human-made elements, the proposed Project would be clearly distinct and would detract from the character of the open ocean horizon. |
| Coastal Bluff | High<br>The Coastal Bluff area is defined by scenic open vistas of the distant ocean and foreground landscape from an elevated vantage point. Views are oriented toward the ocean and often include human-made development such as roads and vehicles, historic structures, and residential development. | High<br>Discrete, elevated views along a visually variable seascape are highly valued. The Gay Head/ Aquinnah area on Martha's Vineyard has strong historic, cultural, and tribal significance. | High<br>Dynamic views are visible from an iconic eastern shoreline with associated cliffs and bluffs. The setting includes the adjacent open ocean with long-distance views. | Small<br>The unit has a small visual geographic extent relegated to specific conditions found as an interstitial space between other, larger units. However, elevation associated with the unit allows for longer-distance views than other units. | Medium<br>Although the proposed Project would appear small on the horizon from this location, the elevated character of the unit enhances the apparent size and scale compared to sea level views. | Large<br>Magnitude rationale is similar to Ocean Beach but more significant because the elevated views available from this unit would increase the apparent scale of the proposed Project. | **Major**<br>The Coastal Bluff Unit is highly sensitive because of the associated elevated open views. The proposed Project would be clearly distinct in areas that have historic, cultural, and tribal significance. |
| Open Ocean | Medium<br>Open water with a generally flat horizon (depending on sea state, weather, and atmospheric conditions) dominates the view and is the focal element in all directions. Away from the shore, the unit has minimal human intrusion, nearly all of which is temporary, in the form of vessel traffic. Closer to shore, human-made features such as jetties, buoys, and other coastal infrastructure are more common but not dominant. The only adjacent unit is the Ocean Beach, resulting in limited views from adjacent units or contrasting edge conditions. | High<br>Special designation locations are present in Nantucket Sound, Vineyard Sound, Buzzards Bay, and the Atlantic Ocean south of Martha's Vineyard and Nantucket. Portions of the unit with and without special designations have biological, commercial, and spiritual character and values. | High<br>This unit has a dominant presence of relatively flat, open ocean and a horizon free of human-made interruptions, along with extensive special designation areas. | Large<br>There is a large area within this unit with unscreened views of the proposed Project. | Large<br>The proposed Project would add an obvious human-made element to otherwise undisturbed natural-appearing views. | Large<br>Impact magnitude would vary based on exact position within this unit. Impacts would be highest close to or within the SWDA, where WTGs and ESPs would be dominant and entirely out of character but would diminish with distance. | **Major**<br>The Open Ocean Unit is highly sensitive, and the proposed Project would be clearly noticeable over a large area. |
| Coastal Dunes | Low<br>Ocean views from the inland side of the Coastal Dune Area are largely bounded by the dune terrain itself. This creates an internal, compressed experience, compared to the open, long-distance views available from the surrounding areas. | Medium<br>Coastal dunes are often strictly regulated ecological communities, valued for their biological function more so than their landscape character. | Low<br>Coastal Dunes are primarily valued for biological function. Views toward the open ocean are limited due to the terrain of the dunes themselves, although dune tops are more exposed to ocean views. | Small<br>The unit has a small visual geographic extent, with Project area views limited to upper slopes and ridges of dunes. Coastal dunes are found between other units and are mostly linear in the landscape. | Small<br>The proposed Project would be a minimal change to landscape and views. | Medium<br>Dunes could block some views of the proposed Project, but views from atop dunes would be more noticeable due to the elevated views (similar to but less elevated than the Coastal Bluff Unit). | **Minor**<br>The Coastal Dunes Unit has a low sensitivity to aesthetic change. While the proposed Project would be noticeable in portions of the unit with ocean views, these views are not universal within this unit. |
| Salt Pond/Tidal Marsh | Low<br>Salt ponds and tidal marshes are common throughout the coastal area and are characterized by shallow open water, buffered by herbaceous grasses and other salt-tolerant vegetation, along with a mix of wildlife. Views over the waterbody and flat marshland extend to adjacent dunes and/or | Medium<br>This unit is more valued for its functional uses (boating, fishing, and clamming) than its landscape character, although the distinctive character of this unit makes it emblematic of the region as a whole. | Medium<br>This setting is valued for its uses and localized views, including views of the open ocean. | Moderate<br>This unit has moderate geographic extent. Salt ponds/tidal marshes are found as interstitial spaces between other units. | Medium<br>The proposed Project would be a noticeable, albeit not large, change to landscape and views. Internal views of the foreground are the focal point of this area, but where seaward views exist, the proposed Project would be noticeable. | Medium<br>Visible from the majority of this unit due to open water and limited topographic relief. Vegetation at the edges of the salt ponds would provide some screening. While this unit is further inland than others, the | **Moderate**<br>The Salt Pond/Tidal Marsh Unit provides areas with some susceptibility to change, where open views toward the ocean and the proposed Project are available. |

| Seascape, Open Ocean, or Landscape Unit | Receptor Sensitivity | | | Impact Magnitude[a] | | | |
|---|---|---|---|---|---|---|---|
| | Susceptibility and Rationale | Value and Rationale | Sensitivity and Rationale | Geographic Extent | Size and Scale and Rationale | Magnitude and Rationale | SLIA Impact Level and Rationale |
| | scrub vegetation. Residences and associated docks and boats are often present along the edges of ponds, many with associated docks and boats. | | | | | proposed Project would be easily discernable in seaward views. | |
| Coastal Scrub Brush | Low<br>Vegetation is predominantly thick and nearly impenetrable, resulting primarily in internal, compressed views of low-growing dense foliage. More distant vistas may exist as view corridors along roadways or where scrub brush transitions to open meadow. | Medium<br>Viewer activity is primarily local travel and recreational trail use, where landscape character is a component of the overall value. | Low<br>Views are constrained within immediate area with most ocean views obscured by vegetation. | Small<br>A small geographic extent of this unit is relegated to specific conditions found as an interstitial space between other, more abundant units. | Small<br>The proposed Project would be a minimal change to landscape and views. | Small<br>Foreground vegetation dominates this character area and dictates the available views. Small view corridors break up the scale and overall geographic extent of the proposed Project | **Minor**<br>The Coastal Scrub Brush Unit has a low sensitivity to changes in the available views. The scale and size of the proposed Project would make it a minor element in the view. |
| Forest | Low<br>Internal views of trees and understory foliage dominate, except for occasional openings in the forest canopy and axial views along roadways. Many other land uses and human activities occur within the forest area and are part of the majority of potential views. | Low<br>Variable vegetation characteristics in relation to typical ocean and seascape environments. This provides for a more enclosed setting for users. Various locally conserved forest stands and state forests are located on both Martha's Vineyard and Nantucket. | Low<br>Views are constrained to the immediate area with ocean views obscured by vegetation. | Small<br>A small geographic extent of this unit has unobstructed views of the Project area, relegated to specific inland conditions. Many views are screened by vegetation. Areas within this unit can be made up of one large forest or a collection of adjacent stands. | Small<br>The proposed Project would be a minimal change to landscape and views. | Small<br>Restricted views available along narrow corridors limit discernibility of proposed Project size, WTG scale, and geographic extent. | **Negligible**<br>The Forest Unit provides very limited options for views toward the ocean and the proposed Project. |
| Shoreline Residential | Medium<br>The local landscape is gently rolling with a mix of coastal scrub, heath, and dunes surrounding maintained residential landscapes. Views are often prescribed to take advantage of the scenic qualities available. This unit adjacent to multiple other units creating unique edge conditions. At these edges views change drastically from inland to offshore. | High<br>Properties in this unit have often been created specifically because of views of the ocean or beachfront landscape. Although human-made structures are common, the value of landscape character is similar to the Ocean Beach and Coastal Bluff units. | High<br>There are visually sensitive areas where open ocean views are integral components of character. | Large<br>There is a large, linear area within this unit with unobstructed views of the Project area. | Medium<br>Although the proposed Project would be small along the horizon from this location, the perceived importance of the scenic view increases the perceived scale of change. | Large<br>This unit experiences static views, often from locations specifically designed to capture views outward over the ocean. Depending on the exact view, the proposed Project magnitude would be similar to the Ocean Beach Unit or Coastal Bluff Unit for elevated areas. | **Major**<br>The Shoreline Residential Unit is highly sensitive, and the proposed Project would be clearly noticeable in available views toward the ocean from static residential viewers. Although WTGs would be a minor element on the horizon, the proposed Project would often be seen in its entirety. |
| Village/Town Center | Low<br>Human-made structures, streets, utilities, and landscaping such as street trees and lawns dominate nearly the entire view, except where this unit transitions to residential or other areas. | Medium<br>Visitors to the population centers are often focused on shopping, dining, and viewing historic features. The entirety of Nantucket Island is within a National Register of Historic Places district. | Low<br>While landscape character is highly valued, this unit offers few ocean views. | Small<br>A small visual geographic extent of area within this unit has unobstructed views of the proposed Project area, relegated to specific inland conditions. Many views are screened by structures or vegetation. | Small<br>The proposed Project would be a minimal change to landscape and views. Structures create small view corridors, offering limited views of the proposed Project as a whole. | Small<br>Restricted views along narrow corridors would limit discernibility of proposed Project size, WTG scale, and geographic extent. | **Negligible**<br>The Village/Town Center Unit provides limited ocean views and has limited susceptibility to changes in the seascape. |
| Rural Residential | Medium<br>Views center on human-made structures such as rural homesteads and limited transportation and utility infrastructure, set amid landscaped or natural vegetation such as lawns, open fields, and forest stands. Views of the seascape or open ocean are rare, due to the inland location of this unit. | Low<br>Rural residences are often inland and are valued for the relative sparseness of human activity and the proximity to natural or natural-appearing inland areas. Views of the seascape or open ocean are not typically expected or sought in this unit. | Low<br>The views are constrained within the immediate area, with ocean views obscured by vegetation. | Small<br>There is a limited geographic extent due to the unit's inland location. | Small<br>The proposed Project would be a minimal change to landscape. | Small<br>The proposed Project would affect a small portion of the overall geographic area of the unit, would be small in scale where visible, and would exist among substantial human-made elements within the existing view. | **Minor**<br>The Rural Residential Unit provides limited ocean views and has limited sensitivity to changes in the seascape, except closer to the coastline where open ocean views are more integral to the landscape character. |
| Suburban Residential | Low<br>Human-made structures, streets, utilities, and landscaping dominate the view and are interspersed with landscaped yards and more natural components such as forest stands. Views of the seascape or open ocean are rare, due to the inland location of this unit. | Low<br>The primary value is the area's residential function, with attention focused inward (i.e., to individual homes and properties). | Low<br>There are localized views and influence of built residential environment. | Small<br>There is a small visual geographic extent relegated to specific inland conditions. | Small<br>The proposed Project would be a minimal change to landscape and views. | Small<br>Restricted views available along narrow corridors would limit discernibility of proposed Project size, WTG scale, and geographic extent. | **Negligible**<br>The Suburban Residential Unit provides limited options for views toward the ocean and the proposed Project and has limited sensitivity to changes in those views. |

| Seascape, Open Ocean, or Landscape Unit | Receptor Sensitivity | | | Impact Magnitude[a] | | | |
|---|---|---|---|---|---|---|---|
| | Susceptibility and Rationale | Value and Rationale | Sensitivity and Rationale | Geographic Extent | Size and Scale and Rationale | Magnitude and Rationale | SLIA Impact Level and Rationale |
| Agricultural/Open Field | Low<br>Views are dominated by open, flat, or rolling terrain with low vegetation (i.e., pasture or field crops) and active agricultural or livestock activity depending on time of year. Long-distance views are often available, although these views rarely stretch to the ocean due to the unit's largely inland location. | High<br>Many agricultural landscapes are protected open space, either by public agencies, private land trusts, or non-profit organizations. These areas are a scenic draw for local residents and tourists alike. | Low<br>Although highly valued, the unit's setting is not typically influenced by views of the ocean; instead, pastoral and agricultural character dominates. | Small<br>There is a small visual extent in most cases except for moderate visual extent for some large plots of agricultural or open land with ocean views. | Small<br>The proposed Project would be a minimal change to landscape. Views would be partially screened by foreground vegetation breaking the horizontal occupancy of the proposed Project and limiting overall perceived size/scale. | Small<br>Views of the proposed Project's extent, size, and scale are limited in most of this unit due to different varieties and sizes of vegetation. | **Minor**<br>The Agricultural/Open Field Unit has low sensitivity to changes in the open ocean due to the limited extent of such views. Where visible from this unit, the proposed Project would be clearly noticeable but would be a minor element of the overall character. |

ESP = electrical service platform; SLIA = seascape and landscape impact assessment; SWDA = Southern Wind Development Area; WTG = wind turbine generator
[a] The SLIA methodology includes a component for duration and reversibility. For all seascape, open ocean, and landscape units, the proposed Project's duration would be long term (30 years), and the proposed Project's visual characteristics would be fully reversible.

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### Table I-11: Horizontal Field of View Occupied by the Proposed Project

| KOP or Location | Distance (miles)[a] | Horizontal FOV (Percent of Human FOV[b]) |
|---|---|---|
| 1. Aquinnah Cultural Center | 25.4 | 35° (28) |
| 3. South Beach (Martha's Vineyard) | 20.6 | 28° (22) |
| 5. Madaket Beach | 24.7 | 19° (15) |
| 8. Tom Nevers Field | 30.9 | 16° (13) |
| East Beach (Martha's Vineyard) | 26.9 | 25° (20) |
| Squibnocket Point[c] | 21.3 | 39° (32) |

FOV = field of view; KOP = key observation point; WTG = wind turbine generator
[a] This is the distance to nearest proposed Project WTG.
[b] The human FOV is 124 degrees (Sullivan 2021).
[c] Squibnocket Point is approximately 1 mile southwest of KOP 11, Squibnocket Beach.

### Table I-12: Visibility Rating Form and Instructions

| Visibility Rating | Description |
|---|---|
| VISIBILITY LEVEL 1: visible only after extended, close viewing; otherwise, invisible. | An object/phenomenon that is near the extreme limit of visibility. It could not be seen by a person who was not aware of it in advance and looking for it. Even under those circumstances, the object can only be seen after looking at it closely for an extended period of time. |
| VISIBILITY LEVEL 2: visible when scanning in general direction of study subject; otherwise, likely to be missed by casual observer. | An object/phenomenon that is very small and/or faint, but when the observer is scanning the horizon or looking more closely at an area, can be detected without extended viewing. It could sometimes be noticed by a casual observer; however, most people would not notice it without some active looking. |
| VISIBILITY LEVEL 3: visible after brief glance in general direction of study subject and unlikely to be missed by casual observer. | An object/phenomenon that can be easily detected after a brief look and would be visible to most casual observers, but without sufficient size or contrast to compete with major landscape elements. |
| VISIBILITY LEVEL 4: plainly visible, could not be missed by casual observer, but does not strongly attract visual attention, or dominate view because of apparent size, for views in general direction of study subject. | An object/phenomenon that is obvious and with sufficient size or contrast to compete with other landscape elements, but with insufficient visual contrast to strongly attract visual attention and insufficient size to occupy most of the observer's visual field. |
| VISIBILITY LEVEL 5: strongly attracts visual attention of views in general direction of study subject. Attention may be drawn by strong contrast in form, line, color, or texture, luminance, or motion. | An object/phenomenon that is not of large size, but that contrasts with the surrounding landscape elements so strongly that it is a major focus of visual attention, drawing viewer attention immediately, and tending to hold viewer attention. In addition to strong contrasts in form, line, color, and texture, bright light sources (such as lighting and reflections) and moving objects associated with the study subject may contribute substantially to drawing viewer attention. The visual prominence of the study subject interferes noticeably with views of nearby landscape elements. |
| VISIBILITY LEVEL 6: dominates view because study subject fills most of visual field for views in its general direction. strong contrasts in form, line, color, texture, luminance, or motion may contribute to view dominance. | An object/phenomenon with strong visual contrasts that is of such large size that it occupies most of the visual field, and views of it cannot be avoided except by turning the head more than 45 degrees from a direct view of the object. The object/phenomenon is the major focus of visual attention, and its large apparent size is a major factor in its view dominance. In addition to size, contrasts in form, line, color, and texture, bright light sources and moving objects associated with the study subject may contribute substantially to drawing viewer attention. The visual prominence of the study subject detracts noticeably from views of other landscape elements. |

Source: Sullivan et al. 2012

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**Table I-13: Proposed Project Characteristics and Visual Impact Factors**

| KOP | Distance (miles)[a] | FOV, Degrees (% of Human FOV)[b] | Noticeable Elements | Components of VIA | | | | | | | | Impact Magnitude |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Form | Line | Color | Texture | Scale | Contrast | Motion | Visibility[c] | |
| 1. Aquinnah Cultural Center | 25.4 | 35° (28) | B, N, OL, T | Weak | Weak | Weak | Weak | Small | Weak | Moderate | 2 | Small |
| 2. Long Point Beach | 22.8 | ND | B, N, OL, T | Weak | Weak | Weak | Weak | Small | Weak | Moderate | 2 | Small |
| 3. South Beach | 20.6 | 28° (22) | B, N, OL, T | Weak | Weak | Weak | Weak | Small | Weak | Moderate | 2 | Small |
| 4. Wasque Reservation | 24.1 | ND | B, N, OL, T | Weak | Weak | Weak | Weak | Small | Weak | Moderate | 2 | Small |
| 5. Madaket Beach | 24.7 | 19° (15) | B, N, OL, T | Weak | Weak | Weak | Weak | Small | Weak | Moderate | 1 | Small |
| 6. Miacomet Beach and Pond | 26.8 | ND | B, N, OL, T | Weak | Weak | Weak | Weak | Small | Weak | Moderate | 2 | Small |
| 7. Bartlett's Farm | 26.9 | ND | B, N, OL, T | Weak | Weak | Weak | Weak | Small | Weak | Moderate | 1 | Small |
| 8. Tom Nevers Field | 30.9 | 16° (13) | B, N, OL | Weak | Weak | Weak | Weak | Small | Weak | Weak | 2 | Small |
| 21. Peaked Hill Reservation | 24.2 | ND | B, N, OL, T | Weak | Weak | Weak | Weak | Small | Weak | Moderate | 2 | Small |
| 22. Representative Offshore View[d] | Varies | Varies | B, E, N, NL, OL, T, Y | Strong | Strong | Strong | Strong | Large | Strong | Strong | 6 | Large |
| 23. Shootflying Hill Road (Existing Hotel) | 0.0 | 124° (100) | S | Strong | Strong | Strong | Strong | Large | Strong | None | 6 | Large |
| 24. Shootflying Hill Road (Right-of-Way #343) | 0.1 | ND | S | Weak | Weak | Weak | Weak | Medium | Weak | None | 4 | Small |
| 25. Exit 6 Park and Ride/ Highway Rest Area | 0.1 | ND | S | Weak | Moderate | Weak | Moderate | Small | Weak | None | 3 | Small |

B = WTG blades; E = electrical service platform; FOV = field of view; KOP = key observation point; N = nacelle; ND = no data; NL = navigation light; OL = nacelle-top obstruction lights; S = Phase 1 onshore substation; T = WTG tower; VIA = visual impact assessment; WTG = wind turbine generator; Y = yellow foundation transition piece

[a] This is the distance to nearest proposed Project WTG.

[b] The human FOV is approximately 124 degrees (Sullivan 2021).

[c] This is as defined in Table I-8 (Sullivan et al. 2012).

[d] Noticeable elements for offshore viewers would vary based on the location of the viewer relative to the offshore wind projects. Based on the likely sizes of WTGs (Table I-8), all elements of an individual WTG would be visible within approximately 14.6 miles of that WTG position (COP Appendix III-H.a, Section 3.2; Epsilon 2022). Visibility rating reflects closest possible views (i.e., adjacent to or within the WTG array), but could range from 1 to 6 depending on the viewer's location.

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Visual contrast determinations involve comparisons of characteristics of the seascape, open ocean, and landscape before and after proposed Project implementation. The range of potential contrasts includes strong, moderate, weak, and none (Sullivan 2021). The strongest daytime contrasts would result from tranquil and flat seas combined with sunlit WTG towers, nacelles, rotating and flickering rotors, and a yellow tower base color against a dark background sky and an undifferentiated foreground. There would be daily variation in WTG color contrast as sun angles change from backlit to front-lit (sunrise to sunset) and the backdrop would vary under different lighting and atmospheric conditions. The weakest daytime contrasts would result from turbulent seas combined with overcast daylight conditions on WTG towers, nacelles, and rotors against an overcast background sky and a foreground occupied by varied landscape elements. The strongest nighttime contrasts would result from dark skies (absent moonlight) combined with navigation lights; activated lighting on the ESPs, mid-tower lights, and nacelle-top lights (with ADLS activation) reflecting off of low clouds and calm (reflective) surf; and the dark-sky light dome. The weakest nighttime contrasts would result from moonlit, cloudless skies; tranquil (reflective) seas; ADLS activation; and only mid-tower lights.

Higher impact levels would stem from the unique, extensive, and long-term appearance of strongly contrasting, large, and prominent vertical structures in the otherwise horizontal seascape environment. In these locations, structures are an unexpected element and viewers are accustomed to open views of high-sensitivity seascape and landscape; and from high-sensitivity view receptors.

The gray, metallic structures of the Phase 1 onshore substation would have strong vertical and horizontal lines from perimeter fencing, electrical conductors, and other equipment at the site. These structures would contrast in form, line, color, and texture with the surrounding wooded areas and nearby suburban residential structures. The substation would cause moderate visual impacts from KOP 23 (immediately adjacent to the substation site on Shootflying Hill Road) but minor impacts from KOPs 24 and 25, due to the presence of existing electrical transmission infrastructure (which reduces contrast) and the effects of post-construction vegetative screening.

Construction, operations, and decommissioning of the proposed Project would involve moving and stationary visual features that would contrast in form, line, color, and texture, scale, and prominence in formerly open seascape. Construction activities may have a larger impact on viewers than operations and decommissioning because the construction viewing context of the SWDA would be an undeveloped portion of the open ocean, whereas the context for operations and decommissioning would be existing WTGs and substations. Construction impacts would be temporary and would include:

- Daytime and nighttime movement of installation vessels, cranes, and other equipment visible in the seascape in and around the SWDA;
- Dawn, dusk, and nighttime construction lighting on WTGs and ESPs;
- Onshore and offshore (i.e., from vessels) views of WTGs and ESPs under construction; and
- Activities at onshore landfall sites along export cable routes, and at the Phase 1 substation.

Operational impacts would be similar to those of end-stage construction and would be long term and fully reversible.

Decommissioning impacts would be the same as construction, with WTG and ESP infrastructure progressively removed over time.

The VIA considers the characteristics of the view receptor and the characteristics of the view toward the proposed Project facilities, and experiential impacts of the proposed Project. The characteristics of the view receptor (i.e., an observer) depends on who the viewer is, their activity, and their expectations and sensitivity to change. In particular, the applicant identified four user groups, as described below (COP Appendix III-H.a; Epsilon 2022):

- **Tourists, seasonal residents, vacationers, and recreational users (Tourists):** These individuals are commonly involved in outdoor recreational activities offshore and at beaches, parks, and conservation areas within the geographic analysis area. Typical activities include sunbathing, beach combing, swimming, walking, bicycling, recreational boating, fishing, and other passive recreation. While the sensitivity of these viewers would vary, tourists could be the most sensitive to changes in the landscape and seascape because quality views of the ocean are likely a primary reason for their visit and an integral part of their recreational experience.
- **Year-round local residents (Residents):** These individuals live, work, and travel in the geographic analysis area. They generally view the landscape from their yards, homes, local roads, and places of employment. The highest population of local residents is in and around town center areas, but many live in more rural portions of the geographic analysis area. Local residents would likely have the best understanding of the aesthetic character and existing conditions of the coastal area. Except when involved in local travel, these viewers are likely to be stationary and may have frequent and/or prolonged views of the proposed Project. They may be sensitive to changes in particular views that are important to them.
- **Through travelers (Travelers):** This group includes non-local viewers with views of the ocean. Through travelers are typically moving, have a relatively narrow FOV oriented along the axis of the roadway, and are destination oriented. Drivers would generally be focused on the road and traffic conditions but do have the opportunity to observe roadside scenery. Passengers in moving vehicles would have greater opportunities for prolonged views and, therefore, may be more aware of the quality of surrounding scenery. Also included in this group are travelers that may transit the ocean on ferries from the mainland. Unlike automobile users, ferry passengers could view the proposed Project for an extended period of time (1 hour or more). Through travelers on vessels include those engaged in passive enjoyment of the ocean ambiance, as well as those who pass the travel time occupying themselves with business or other personal activities. At its closest point, the Hyannis-Nantucket ferry passes within 20 miles of the SWDA. Views of the proposed Project from the Hyannis-Nantucket ferry would occur within a narrow view corridor between Nantucket, Tuckernuck Island, Muskeget Island, and Martha's Vineyard.
- **Commercial mariners, fishermen, and seamen (Commercial Mariners):** Individuals transiting the ocean for commercial purposes would typically have low visual sensitivity to the presence of the offshore facilities of the proposed Project. These viewers would be engaged in activities associated with their jobs with minimal focus on the aesthetic character of their surroundings. Moreover, commercial mariners would be more accustomed to the presence of industrial activities and ocean-going vessels within their daily environment than other viewer types.

Table I-14 summarizes the viewer sensitivity, view receptor susceptibility, view value, and summary of the measures of effects from the visible character and magnitude of the offshore and onshore components of the proposed Project (Sullivan 2021). The size and scale component of magnitude in Table I-14 accounts for the motion of the WTG blades, as well as the overall mass of the WTGs from the proposed Project.

**Table I-14: Visual Impact Levels, Proposed Project**

| | | Receptor Sensitivity | | | Impact Magnitude | | | |
|---|---|---|---|---|---|---|---|---|
| **KOP** | **User Groups** | **Susceptibility** | **Value** | **Sensitivity** | **Size and Scale** | **Geographic Extent** | **Magnitude** | **VIA Impact Rating** |
| 1. Aquinnah Cultural Center | Tourists | High | High | High | Small | Medium | Small | Minor |
| 2. Long Point Beach | Tourists, Residents | High | High | High | Small | Medium | Small | Minor |
| 3. South Beach | Tourists, Residents | High | High | High | Small | Medium | Small | Minor |
| 4. Wasque Reservation | Tourists, Residents | High | High | High | Small | Medium | Small | Minor |
| 5. Madaket Beach | Tourists, Residents | High | High | High | Small | Small | Small | Minor |
| 6. Miacomet Beach and Pond | Tourists, Residents | High | High | High | Small | Small | Small | Minor |
| 7. Bartlett's Farm | Tourists, Residents | High | High | High | Small | Small | Small | Minor |
| 8. Tom Nevers Field | Tourists, Residents | High | High | High | Small | Small | Small | Minor |
| 21. Peaked Hill Reservation | Tourists, Residents | High | High | High | Small | Small | Small | Minor |
| 22. Representative Offshore View | Tourists, Residents, Commercial Mariners | High | High | High | Large | Large | Large | Major |
| 23. Shootflying Hill Road (Existing Hotel) | Residents | Low | Low | Low | Large | Large | Large | Moderate |
| 24. Shootflying Hill Road (Right-of-Way #343) | Residents | Low | Low | Low | Medium | Medium | Medium | Minor |
| 25. Exit 6 Park and Ride/ Highway Rest Area | Tourists, Residents, Travelers | Low | Low | Low | Medium | Medium | Medium | Minor |

KOP = key observation point; VIA = visual impact assessment

The KOPs identified in Table I-7 and evaluated in Table I-14 share several receptor and impact characteristics, as described below.

- All KOPs (except for KOPs 23 through 25, which focus on the Phase 1 onshore substation) occur at locations known and valued for high-quality visual experiences. Many are heavily visited because of these high-quality visual experiences. As a result, all KOPs focused on ocean views have high sensitivity.
- KOPs 23 through 25 occur at locations not valued for high-quality visual experiences. As a result, these locations have low sensitivity.
- For all KOPs, the proposed Project's duration would be long term (30 years), and the proposed Project's impacts would be fully reversible.

Based on the analysis summarized in Table I-14, the proposed Project would have minor impacts on onshore viewer experience, and potentially major impacts on offshore viewer experience.

### I.4.4 Cumulative Impacts

This section evaluates cumulative seascape, landscape, and visual impacts of ongoing and planned activities—specifically offshore wind projects that have been approved (ongoing activities) or proposed (planned activities)—in combination with the proposed Project. This section focuses on cases where WTGs and ESPs from multiple projects would be visible simultaneously from seascape, open ocean, or landscape units as overlapping or adjacent features and elements. It also addresses impacts on viewers observing multiple projects simultaneously. Table I-15 provides characteristics for the other offshore wind projects in the RI/MA Lease Areas. Table I-16 describes the horizontal FOV from selected viewpoints, as shown on maps in Attachment I-3. In all cases, the proposed Project WTGs would be entirely within the horizontal FOV of the other offshore wind projects. As with the proposed Project alone, the horizontal FOV from any single viewpoint within a seascape or landscape unit can vary; therefore, Table I-16 provides the maximum FOV extent for onshore seascape and landscape units.

Attachment I-2 presents the applicant's simulations of the incremental effects of the proposed Project in the context of other planned wind farms. Attachment I-4 includes maps showing the number of WTG blades and nacelle-tops theoretically visible from Martha's Vineyard and Nantucket. Table I-17 summarizes visible elements, components of magnitude, and the seascape/landscape impact of the other offshore wind projects, along with a cumulative seascape and landscape impact magnitude of the proposed Project combined with other offshore wind projects. The sensitivity of each seascape, open ocean, and landscape unit in Table I-17 is the same as described in Table I-10.

Table I-18 summarizes elements of other offshore wind projects and their visual impacts (i.e., impacts on viewer experience), while Table I-16 provides the same analysis for other offshore wind projects, including the proposed Project. The content of Tables I.4-11 and I.4-12 are similar to Table I-14. The only ongoing or planned onshore activity that would potentially generate cumulative impacts when combined with the proposed Project would be the onshore substation for the Vineyard Wind 1 Project. This project would use the West Barnstable Substation site but would not use the properties on Shootflying Hill Road.

### Table I-15: Wind Turbine Generator Capacity and Height Assumptions

| Project (Lease Area) | Status | Blade Tip Height (Feet, MLLW)[a] | Top of Nacelle Height (Feet, MLLW) | Total WTGs | WTGs within 46 Miles[b] |
|---|---|---|---|---|---|
| Vineyard Wind 1 (OCS-A 0501) | Ongoing | 812 | 451 | 62 | 62 |
| South Fork Wind (OCS-A 0517) | Ongoing | 840 | 482 | 15 | 15 |
| Sunrise Wind (OCS-A 0486) | Planned | 968 | 580 | 122 | 122 |
| Revolution Wind (OCS-A 0517) | Planned | 873 | 522 | 100 | 100 |
| Mayflower Wind (OCS-A 0521) | Planned | 1,066 | 720 | 147 | 135 |
| Beacon Wind (OCS-A 0520)[c] | Planned | 1,086 | 605 | 103 | 103 |
| Bay State Wind (OCS-A 0500) | Planned | 853 | 500 | 165 | 165 |
| Vineyard Wind NE (OCS-A 0522)[c] | Planned | 1,171 | 725 | 138 | 131 |
| Remainder (OCS-A 0520) | Planned | 1,086 | 605 | 51 | 50 |
| Totals | | | | 1,033 | 1,013 |

COP = Construction and Operations Plan; MLLW = mean lower low water; WTG = wind turbine generator
[a] Elevation above MLLW with the WTG blade at its maximum vertical extension.
[b] Indicates the number of WTGs within 46 miles (the maximum theoretical extent of visibility, as described in Section 1.2) of the shoreline of Martha's Vineyard or Nantucket.
[c] No COP had been submitted for these projects at the time this assessment was prepared. As a result, WTG blade tip and nacelle-top heights for these projects were assumed to match Mayflower Wind.

### Table I-16: Horizontal Field of View Occupied by Ongoing and Planned Offshore Wind Projects

| KOP or Location | Distance (miles)[a] | Horizontal FOV (Percent of Human FOV[b]) |
|---|---|---|
| 1. Aquinnah Cultural Center | 13.8 | 124° (100) |
| 3. South Beach (Martha's Vineyard) | 14.8 | 111° (89) |
| 5. Madaket Beach | 16.6 | 105° (85) |
| 8. Tom Nevers Field | 22.9 | 91° (73) |
| East Beach (Martha's Vineyard) | 18.0 | 103° (83) |
| Squibnocket Point[c] | 21.3 | 39° (32) |

FOV = field of view; KOP = key observation point; WTG = wind turbine generator
[a] This is the distance to nearest WTG.
[b] The human FOV is 124 degrees (Sullivan 2021).
[c] Squibnocket Point is approximately 1 mile southwest of KOP 11, Squibnocket Beach.

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**Table I-17: Characteristics and Cumulative Seascape/Landscape Impacts of the Proposed Project and Other Offshore Wind Projects**

| Seascape, Open Ocean, and Landscape Unit | Noticeable Elements[a,b] | Receptor Sensitivity[c] | Impact Magnitude, Other Offshore Wind Projects | | | Impact Magnitude, Proposed Project[d] | Cumulative Impact Magnitude, Proposed Project and Other Offshore Wind Projects |
|---|---|---|---|---|---|---|---|
| | | | Geographic Extent | Size and Scale and Rationale | Magnitude and Rationale | | |
| Ocean Beach | B, E, N, OL, T | High | Large<br>There is a large linear area within this unit with unobstructed views of the proposed Project area. | Large<br>The other offshore wind projects would add human-made elements visible from large portions of the unit that currently have unobstructed ocean views, encompassing much of the seaward horizon. Signs of human intervention surround the open and otherwise undisturbed ocean view. The visible extent of human influence varies by season and exact location. | Large<br>The other offshore wind projects would impact large portions (in many cases the entirety) of the geographic area of this unit. While the WTGs would be small in scale where visible, they would be distinctly different from the unobstructed ocean horizon with limited human-made elements visible and would be unavoidable visual elements. | Major | Large |
| Coastal Bluff | B, E, N, OL, T | High | Small<br>There is a small visual geographic extent of unit relegated to specific conditions found as an interstitial space between other larger units. However, elevation associated with the unit allows for longer-distance views than other units. | Large<br>The other offshore wind projects would appear small on the horizon from this location but would occupy substantial portions of the seaward views. The elevated character of the unit enhances the apparent size and scale compared to sea level views. | Large<br>Magnitude rationale is similar to the Ocean Beach Unit, but more significant because the elevated views available from this unit would increase the apparent scale of the other offshore wind projects. | Major | Large |
| Open Ocean[b] | B, E, N, NL, OL, T, Y | High | Large<br>There is a large area within this unit with unscreened views of the proposed Project. | Large<br>The other offshore wind projects would add extensive and obvious human-made elements to otherwise undisturbed natural-appearing views. | Large<br>Impact magnitude would vary based on exact position within the Open Ocean Unit. Impacts would be highest close to or within the wind development areas where WTGs and ESPs would be dominant and entirely out of character but would diminish with distance. | Major | Large |
| Coastal Dunes | B, E, N, OL, T | Medium | Small<br>There is a small visual geographic extent of this unit with Project area views limited to upper slopes and ridges of dunes. Coastal dunes are found between other units and are f mostly linear in the landscape. | Small<br>The other offshore wind projects would be a minimal change to landscape and views. | Large<br>Dunes could block some views of the other offshore wind projects, but in views from atop dunes, the projects would be more noticeable due to the elevated views (similar to, but less elevated than, the Coastal Bluff Unit). Overall, magnitude would be similar to the Ocean Beach Unit. | Minor | Large |
| Salt Pond/Tidal Marsh | B, E, N, OL, T | Medium | Moderate<br>This unit has a moderate geographic extent. Salt ponds/tidal marshes are found as interstitial spaces between other units. | Medium<br>The other offshore wind projects would be a noticeable, albeit not large, change to landscape and views. Internal views of the foreground are the focal point of this area, but where seaward views exist, the proposed Project would be noticeable. | Medium<br>Offshore wind projects would be visible from the majority of this unit due to open water and limited topographic relief. Vegetation at the edges of the salt ponds would provide some screening. WTGs would be easily discernable and would affect substantial portions of this unit. | Moderate | Medium |
| Coastal Scrub Brush | B, E, N, OL, T | Low | Small<br>This unit has a small geographic extent relegated to specific conditions found as an interstitial space between other, more abundant units. | Small<br>The other offshore wind projects would be a minimal change to landscape and views. | Medium<br>Foreground vegetation dominates this area and dictates the available views. Limited view corridors break up the scale and apparent overall size of the other offshore wind projects. | Minor | Medium |
| Forest | B, OL, T | Low | Small<br>This unit has a small geographic extent with unobstructed views of the proposed Project relegated to specific inland conditions. Many views are screened by vegetation. Areas within this unit can be made up of one large forest or a collection of adjacent stands. | Small<br>The other offshore wind projects would be a minimal change to landscape and views. | Small<br>Restricted views available only along narrow corridors would limit discernibility of WTG scale and apparent overall size of the other offshore wind projects. | Negligible | Medium |
| Shoreline Residential | B, E, N, OL, T | High | Large<br>There is a large linear area within this unit with unobstructed views of the proposed Project area. | Large<br>The other offshore wind projects would appear small on the horizon from this location but would occupy substantial portions of the seaward views. The perceived importance of the scenic view increases the perceived scale of change. | Large<br>This unit is characterized by views from fixed locations, often from locations specifically designed to capture views outward over the ocean. Depending on the exact view, the impact magnitude would be similar to the Ocean Beach Unit, or the Coastal Bluff Unit for elevated areas. | Major | Major |

| Seascape, Open Ocean, and Landscape Unit | Noticeable Elements[a,b] | Receptor Sensitivity[c] | Impact Magnitude, Other Offshore Wind Projects | | | Impact Magnitude, Proposed Project[d] | Cumulative Impact Magnitude, Proposed Project and Other Offshore Wind Projects |
|---|---|---|---|---|---|---|---|
| | | | Geographic Extent | Size and Scale and Rationale | Magnitude and Rationale | | |
| Village/Town Center | B, OL, T, S | Low | Small<br>There is a small visual geographic extent of area within this unit with unobstructed views of the proposed Project relegated to specific inland conditions. Many views are screened by structures or vegetation. | Small<br>The other offshore wind projects would be a minimal change to landscape and views. Structures create small view corridors offering limited views of the proposed Project as a whole. | Small<br>Restricted views available along narrow corridors would limit discernibility of WTG scale and geographic extent. | Negligible | Small |
| Rural Residential | B, OL, T, S | Low | Small<br>There is a limited geographic extent due to the unit's inland location. | Small<br>The other offshore wind projects would be a minimal change to landscape. | Small<br>Other offshore wind projects would affect a small portion of the overall geographic area of the unit and would exist among substantial human-made elements within the existing view. | Minor | Small |
| Suburban Residential | B, OL, T, S | Low | Small<br>There is a small visual geographic extent relegated to specific inland conditions. | Small<br>The other offshore wind projects would be a minimal change to landscape and views. | Small<br>Restricted views available along narrow corridors would limit discernibility of WTG scale and geographic extent. | Negligible | Small |
| Agricultural/Open Field | B, OL, T | Low | Small<br>There is a small visual extent in most cases except for a moderate visual extent for some large plots of agricultural or open land with ocean views. | Small<br>The other offshore wind projects would be a minimal change to landscape. Views would be partially screened by foreground vegetation breaking the horizontal occupancy of the proposed Project and limiting overall perceived size/scale. | Small<br>Views of the extent, size, and scale of other offshore wind projects are limited in most of this unit due to different varieties and sizes of vegetation. | Minor | Small |

ADLS = aircraft detection lighting system; B = WTG blades; E = electrical service platform; N = nacelle; ND = no data; NL = navigation light; OL = nacelle-top obstruction lights; T = WTG tower; WTG = wind turbine generator; Y = yellow foundation transition piece
[a] Impacts of nacelle-top obstruction lights and mid-tower lights would be negligible until the ADLS activates nacelle-top and mid-tower obstruction lights.
[b] Noticeable elements from the Open Ocean Unit would vary based on the location relative to the offshore wind projects. Based on the likely sizes of WTGs (Table I-9), all elements of an individual WTG would be visible within approximately 14.6 miles of that WTG position (COP Appendix III-H.a, Section 3.2; Epsilon 2022).
[c] Descriptions of receptor susceptibility, value, and sensitivity ratings are the same as in Table I-7.
[d] As established in Table I-7.

**Table I-18: Characteristics and Visual Impacts of Other Offshore Wind Projects**

| KOP | Distance (miles)[a] | User Groups | FOV, Degrees (% of Human FOV)[b] | Noticeable Elements | Components of VIA | | | | | | | Impact Magnitude |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Form | Line | Color | Texture | Scale | Contrast | Visibility[c] | |
| 1. Aquinnah Cultural Center | 13.8 | Tourists | 124° (100) | B, N, OL, T | Moderate | Weak | Weak | Weak | Moderate | Moderate | 3 | Moderate |
| 2. Long Point Beach | 14.9 | Tourists, Residents | ND | B, E, N, OL, T | Moderate | Moderate | Weak | Weak | Moderate | Moderate | 3 | Moderate |
| 3. South Beach | 14.8 | Tourists, Residents | 111° (89) | B, N, OL, T | Moderate | Moderate | Weak | Weak | Moderate | Moderate | 3 | Moderate |
| 4. Wasque Reservation | 15.1 | Tourists, Residents | ND | B, E, N, OL, T | Moderate | Moderate | Weak | Weak | Moderate | Moderate | 3 | Moderate |
| 5. Madaket Beach | 16.6 | Tourists, Residents | 105° (85) | B, N, OL, T | Moderate | Moderate | Weak | Weak | Moderate | Moderate | 3 | Moderate |
| 6. Miacomet Beach/Pond | 18.6 | Tourists, Residents | ND | B, E, N, OL, T | Moderate | Moderate | Weak | Weak | Moderate | Moderate | 3 | Moderate |
| 7. Bartlett's Farm | 18.8 | Tourists, Residents | ND | B, N, OL, T | Weak | Weak | Weak | Weak | Small | Small | 2 | Minor |
| 8. Tom Nevers Field | 22.9 | Tourists, Residents | 91° (73) | B, N, OL, T | Moderate | Moderate | Weak | Weak | Moderate | Moderate | 3 | Moderate |
| 21. Peaked Hill Reservation | 16.4 | Tourists, Residents | ND | B, E, N, OL, T | Moderate | Moderate | Weak | Weak | Moderate | Moderate | 3 | Moderate |
| 22. Representative Offshore View[d] | Varies | Tourists, Residents, Commercial Mariners | Varies | B, E, N, NL, OL, T, Y | Strong | Strong | Strong | Strong | Large | Strong | 6 | Major |
| 23. Shootflying Hill Road (Existing Hotel) | 0.0 | Residents | 124° (100) | S | Weak | Weak | Weak | Weak | Weak | Weak | 1 | Negligible |
| 24. Shootflying Hill Road (Right-of-Way #343) | 0.1 | Residents | ND | S | Weak | Weak | Weak | Weak | Weak | Weak | 1 | Negligible |
| 25. Exit 6 Park and Ride/ Highway Rest Area | 0.1 | Tourists, Residents, Travelers | ND | S | Weak | Weak | Weak | Weak | Weak | Weak | 1 | Negligible |

B = WTG blades; E = electrical service platform; FOV = field of view; KOP = key observation point; N = nacelle; ND = no data; NL = navigation light; OL = nacelle-top obstruction lights; T = WTG tower; VIA = visual impact assessment; WTG = wind turbine generator; Y = yellow foundation transition piece
[a] This is the distance to nearest proposed Project WTG.
[b] The human FOV is 124 degrees (Sullivan 2021).
[c] This is as defined in Table I-8 (Sullivan et al. 2012).
[d] Noticeable elements for offshore viewers would vary based on the location of the viewer relative to the offshore wind projects. Based on the likely sizes of WTGs (Table I-9), all elements of an individual WTG would be visible within approximately 14.6 miles of that WTG position (COP Appendix III-H.a, Section 3.2; Epsilon 2022). Visibility rating reflects closest possible views (i.e., adjacent to or within the WTG array), but could range from 1 to 6 depending on the viewer's location.

**Table I-19: Characteristics and Cumulative Visual Impacts of the Proposed Project and Other Offshore Wind Projects**

| KOP | Proposed Project Impact Magnitude (Table I-14) | Other Offshore Wind Project Magnitudes (Table I-18) | Cumulative Impact Magnitude |
|---|---|---|---|
| 1. Aquinnah Cultural Center | Minor | Moderate | Moderate |
| 2. Long Point Beach | Minor | Moderate | Moderate |
| 3. South Beach | Minor | Moderate | Moderate |
| 4. Wasque Reservation | Minor | Moderate | Moderate |
| 5. Madaket Beach | Minor | Moderate | Moderate |
| 6. Miacomet Beach/Pond | Minor | Moderate | Moderate |
| 7. Bartlett's Farm | Minor | Minor | Small |
| 8. Tom Nevers Field | Minor | Moderate | Moderate |
| 21. Peaked Hill Reservation | Minor | Moderate | Moderate |
| 22. Representative Offshore View[d] | Major | Major | Large |
| 23. Shootflying Hill Road (Existing Hotel) | Moderate | Negligible | Moderate |
| 24. Shootflying Hill Road (Right-of-Way #343) | Minor | Negligible | Minor |
| 25. Exit 6 Park and Ride/ Highway Rest Area | Minor | Negligible | Minor |

ESP = electrical service platform; FOV = field of view; KOP = key observation point; WTG = wind turbine generator
[a] This is the distance to nearest proposed Project WTG.
[b] The human FOV is 124 degrees (Sullivan 2021). The proposed Project WTGs and ESPs would be within the same FOV as other offshore wind projects from all KOPs.
[c] This is as defined in Table I-11 (Sullivan et al. 2012).
[d] Noticeable elements for offshore viewers would vary based on the location of the viewer relative to the offshore wind projects. Based on the likely sizes of WTGs (Table I-12), all elements of an individual WTG would be visible within approximately 14.6 miles of that WTG position (COP Appendix III-H.a, Section 3.2; Epsilon 2022). Visibility rating reflects closest possible views (i.e., adjacent to or within the WTG array), but could range from 1 to 6 depending on the viewer's location.

## I.5 References

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## ATTACHMENT I-1: VIEWSHED MAP OF THE PROPOSED PROJECT

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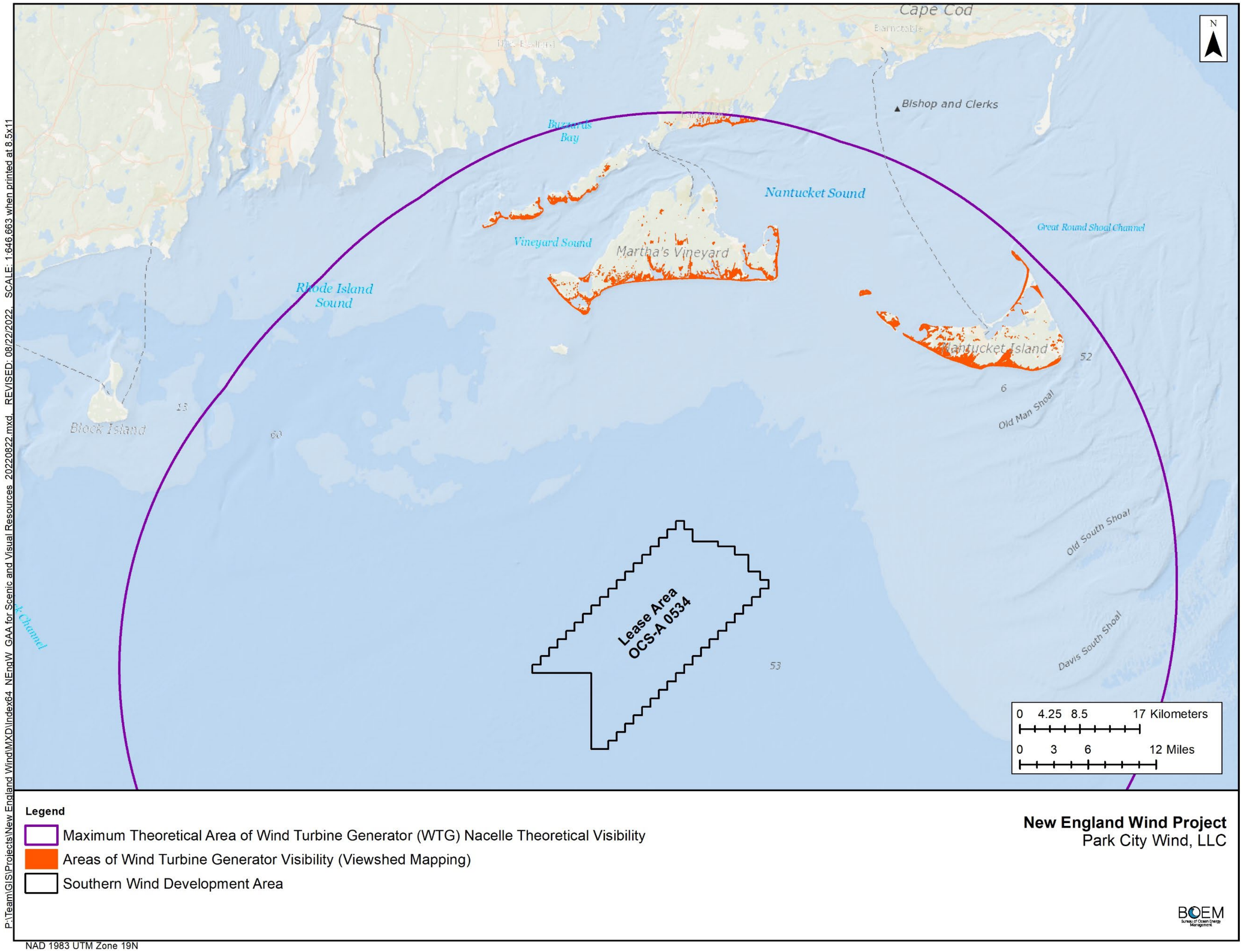


**Figure I-1-1: Areas with Theoretical Visibility of Proposed Project Wind Turbine Generator Blades**

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## ATTACHMENT I-2: APPLICANT-PREPARED SIMULATIONS

See COP Appendix III-H.a (Epsilon 2022)

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## ATTACHMENT I-3: FIELD OF VIEW ANALYSIS

I-3-1: Angle of Views to Turbines Theoretically Visible to Gay Head Lighthouse

I-3-2: Angle of Views to Turbines Theoretically Visible to South Beach

I-3-3: Angle of Views to Turbines Theoretically Visible to Madaket Beach

I-3-4: Angle of Views to Turbines Theoretically Visible to Tom Nevers Field

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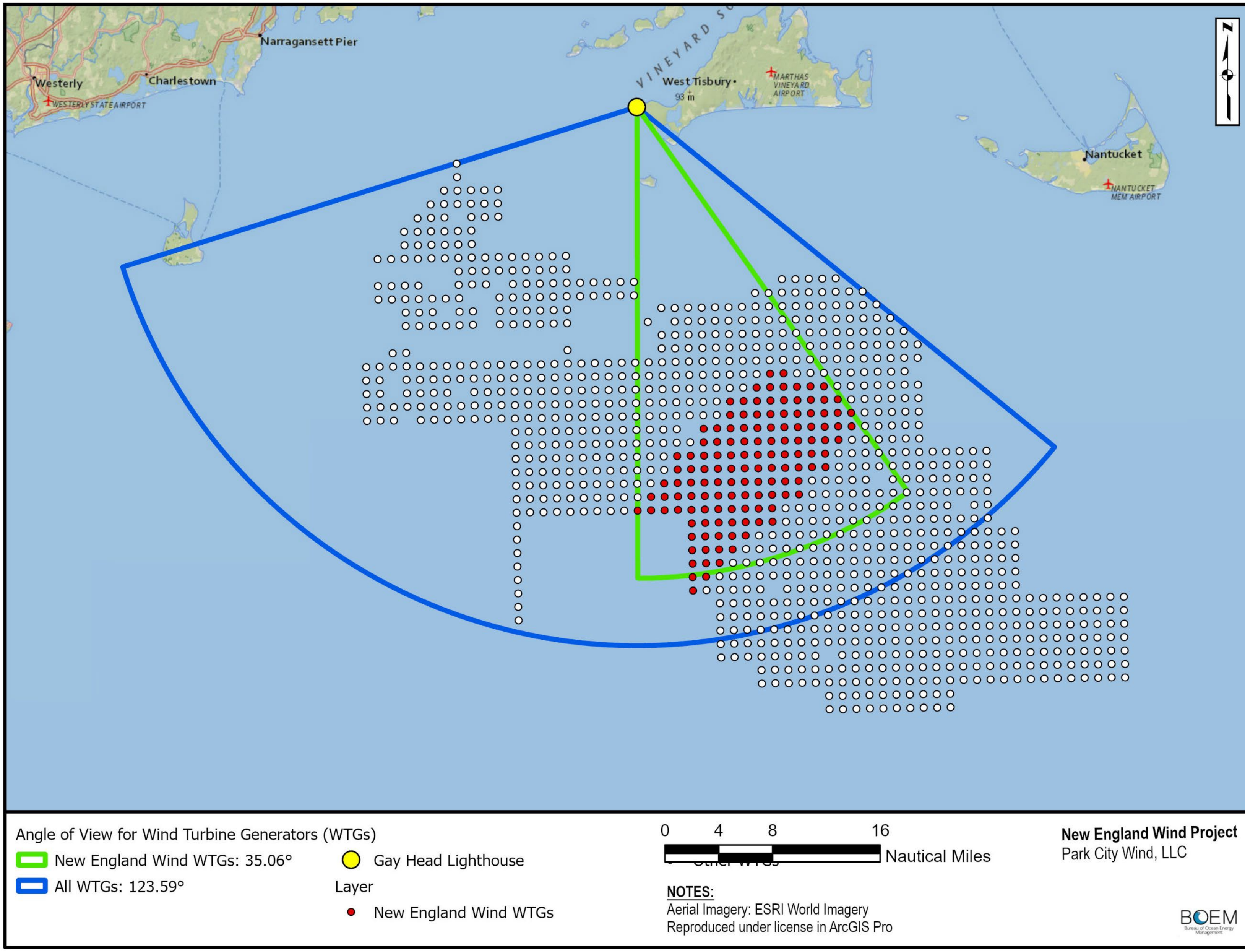


**Figure I-3-1: Angle of Views to Turbines Theoretically Visible from Gay Head Lighthouse**

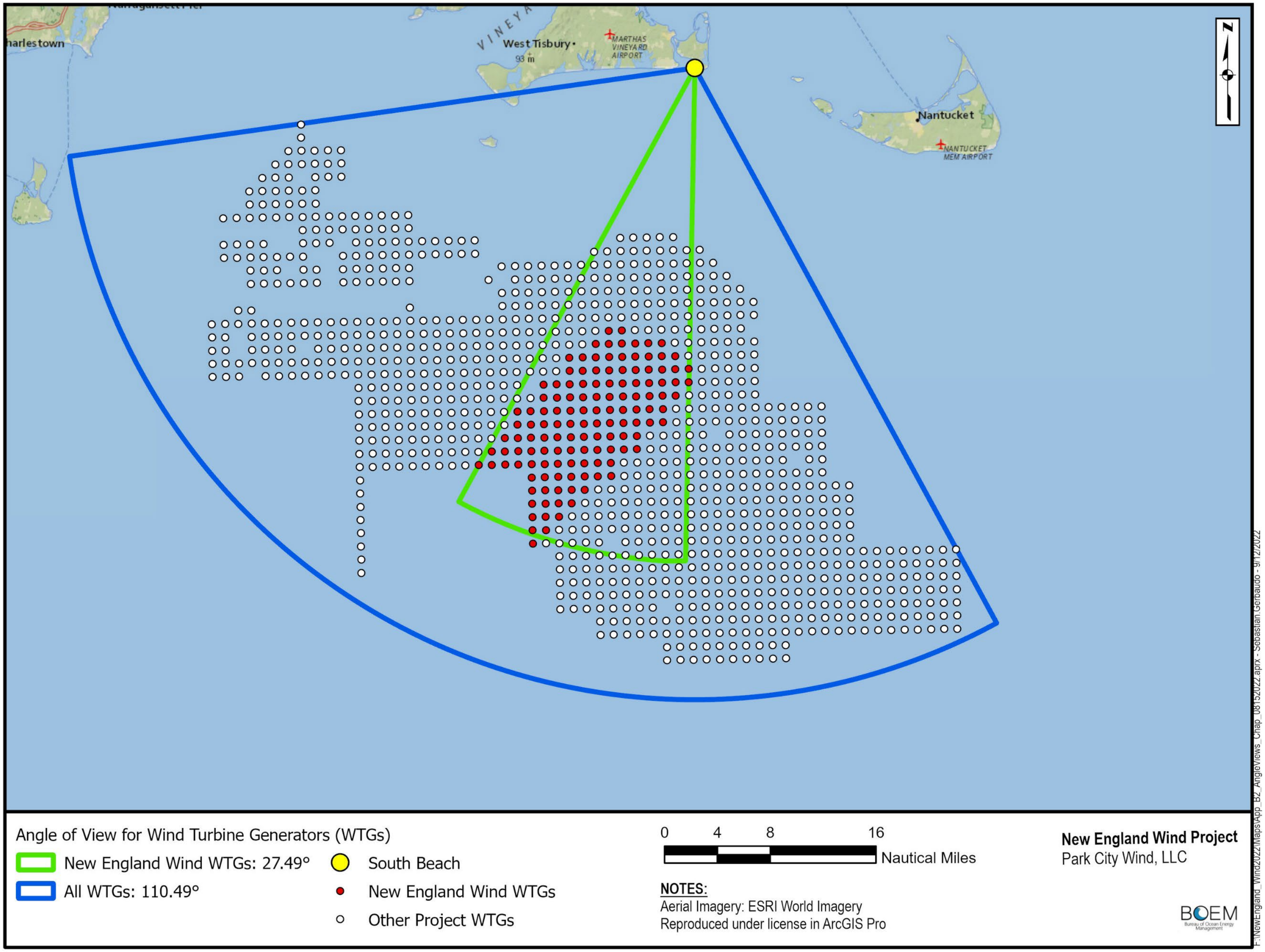


**Figure I-3-2: Angle of Views to Turbines Theoretically Visible to South Beach**

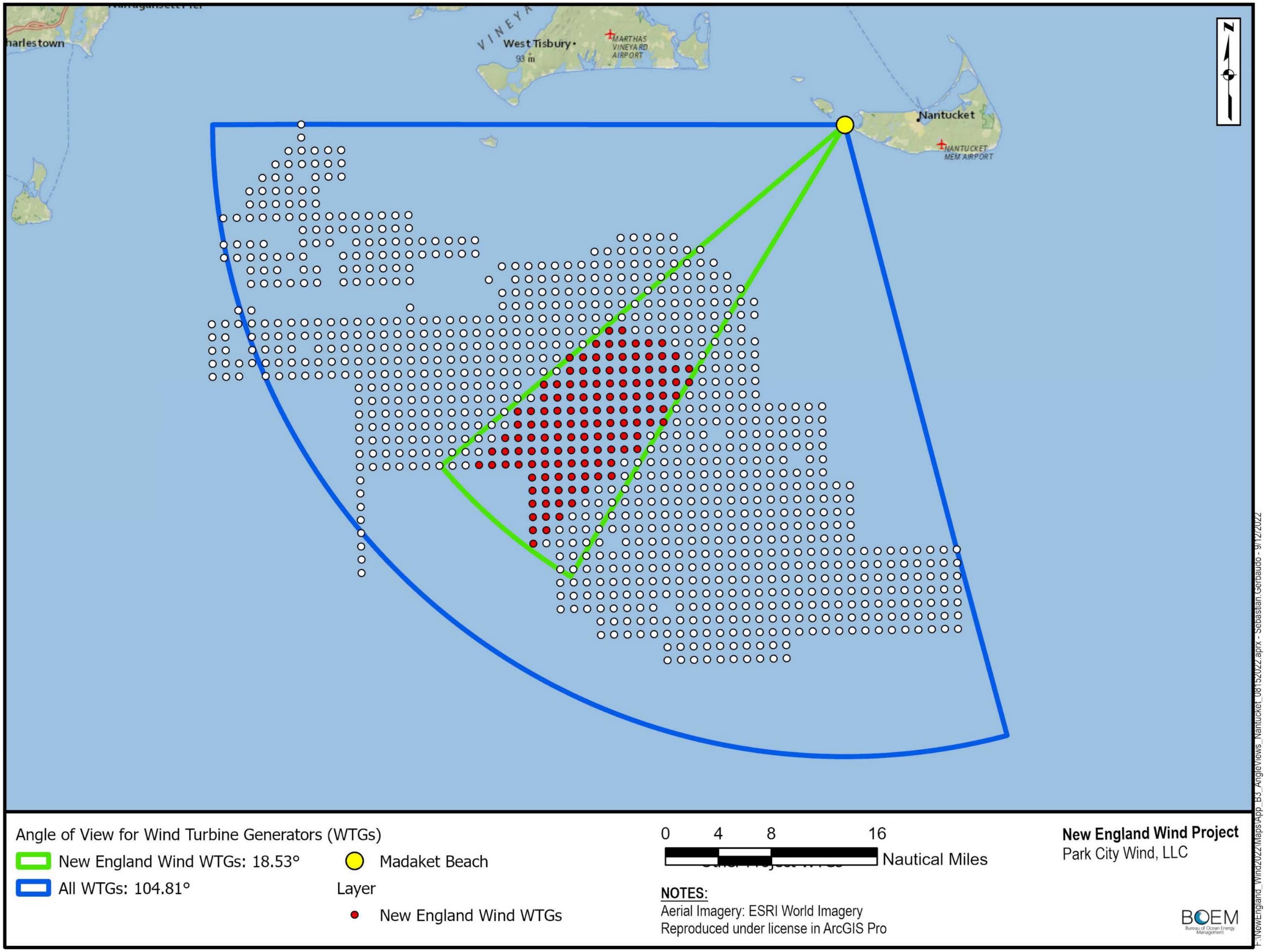


**Figure I-3-3: Angle of Views to Turbines Theoretically Visible to Madaket Beach**

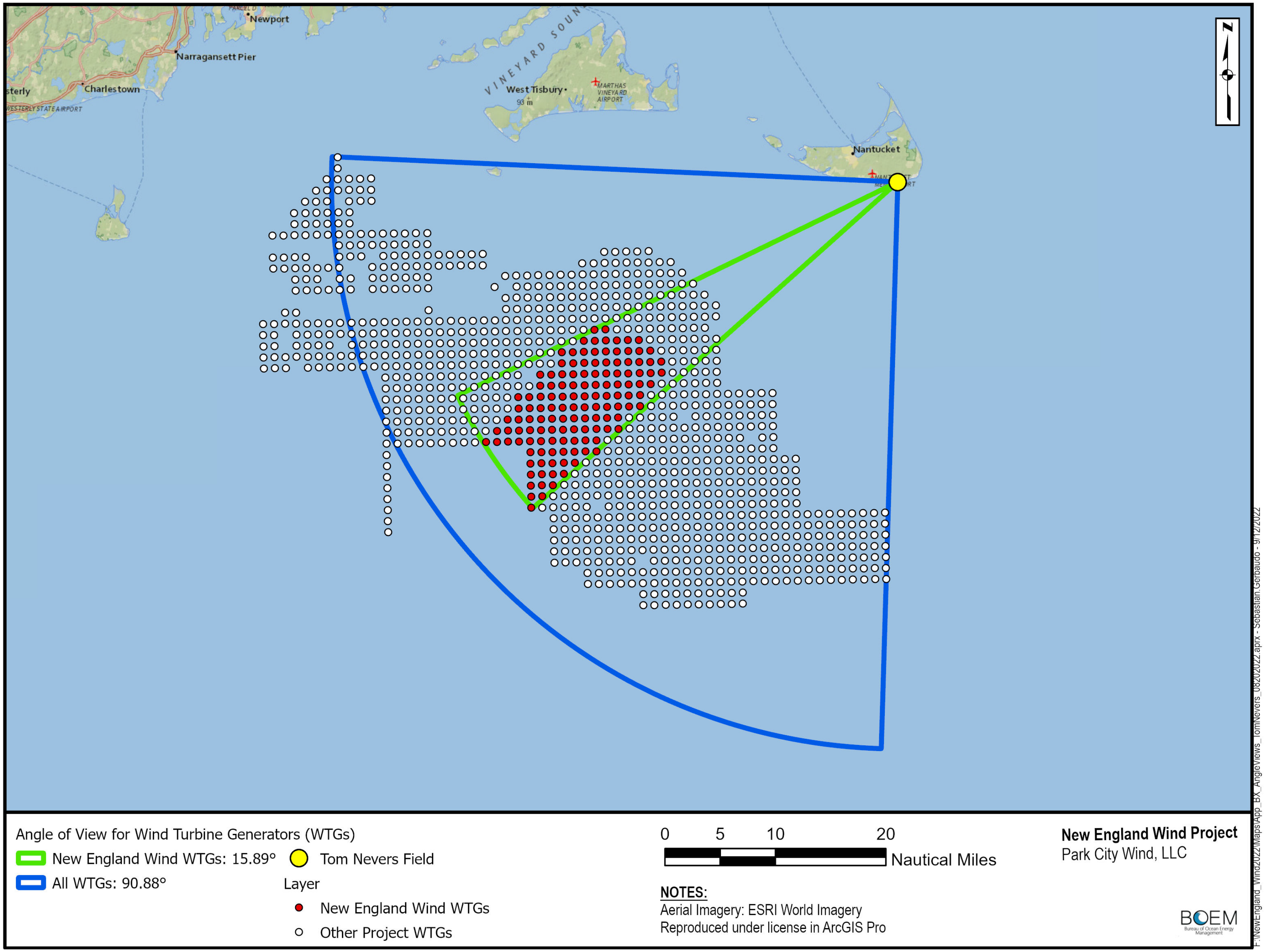


**Figure I-3-4: Angle of Views to Turbines Theoretically Visible to Tom Nevers Field**

# ATTACHMENT I-4: INTERVISIBILITY MAPS

I-4-1: Intervisibility Maps: Aquinnah Area (Martha's Vineyard)

I-4-2: Intervisibility Maps: Chappaquiddick Island (Martha's Vineyard)

I-4-3: Intervisibility Maps (blade tips): Nantucket Island

I-4-4: Intervisibility Maps (nacelles): Nantucket Island

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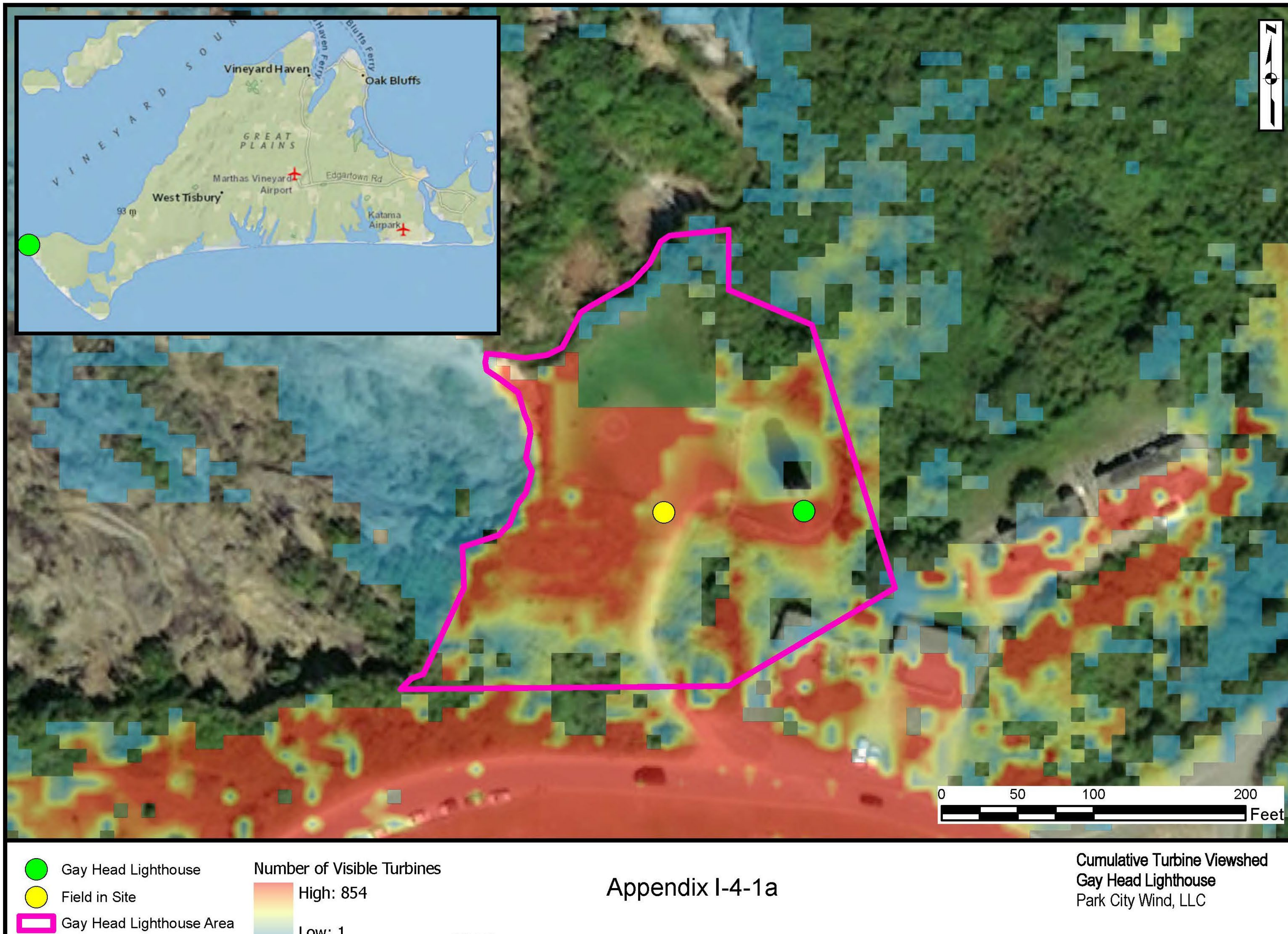
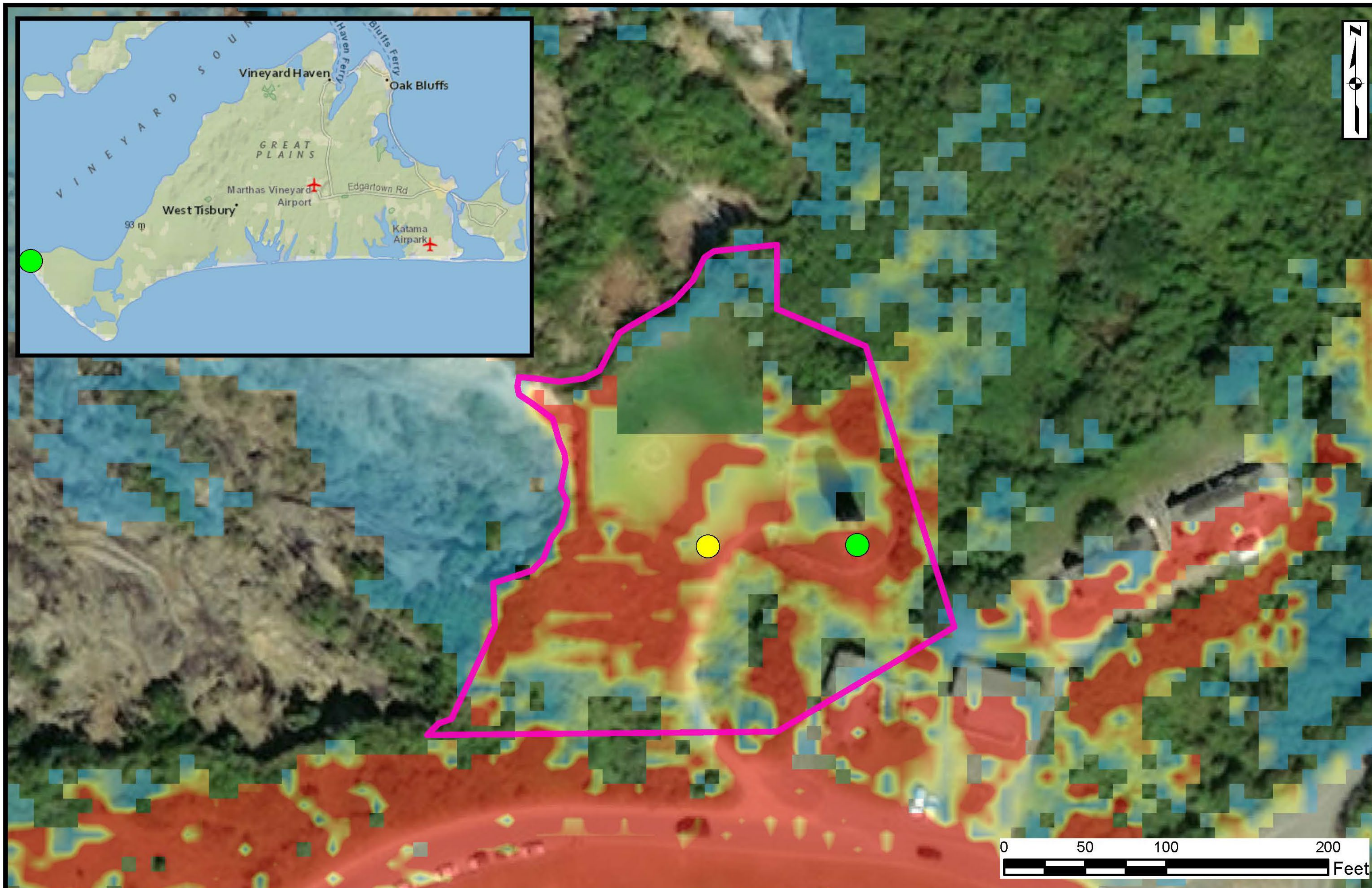



Appendix I-4-1a

**Cumulative Turbine Viewshed**
**Gay Head Lighthouse**
Park City Wind, LLC

**NOTES:**
Aerial Imagery: ESRI World Imagery Reproduced under license in ArcGIS Pro




Gay Head Lighthouse
Field in Site
Gay Head Lighthouse Area

Number of Visible Nacelles
High: 845
Low: 1

## Appendix I-4-1b

**Cumulative Nacelle Viewshed**
**Gay Head Lighthouse**
Park City Wind, LLC

**NOTES:**
Aerial Imagery: ESRI World Imagery Reproduced under license in ArcGIS Pro

BOEM

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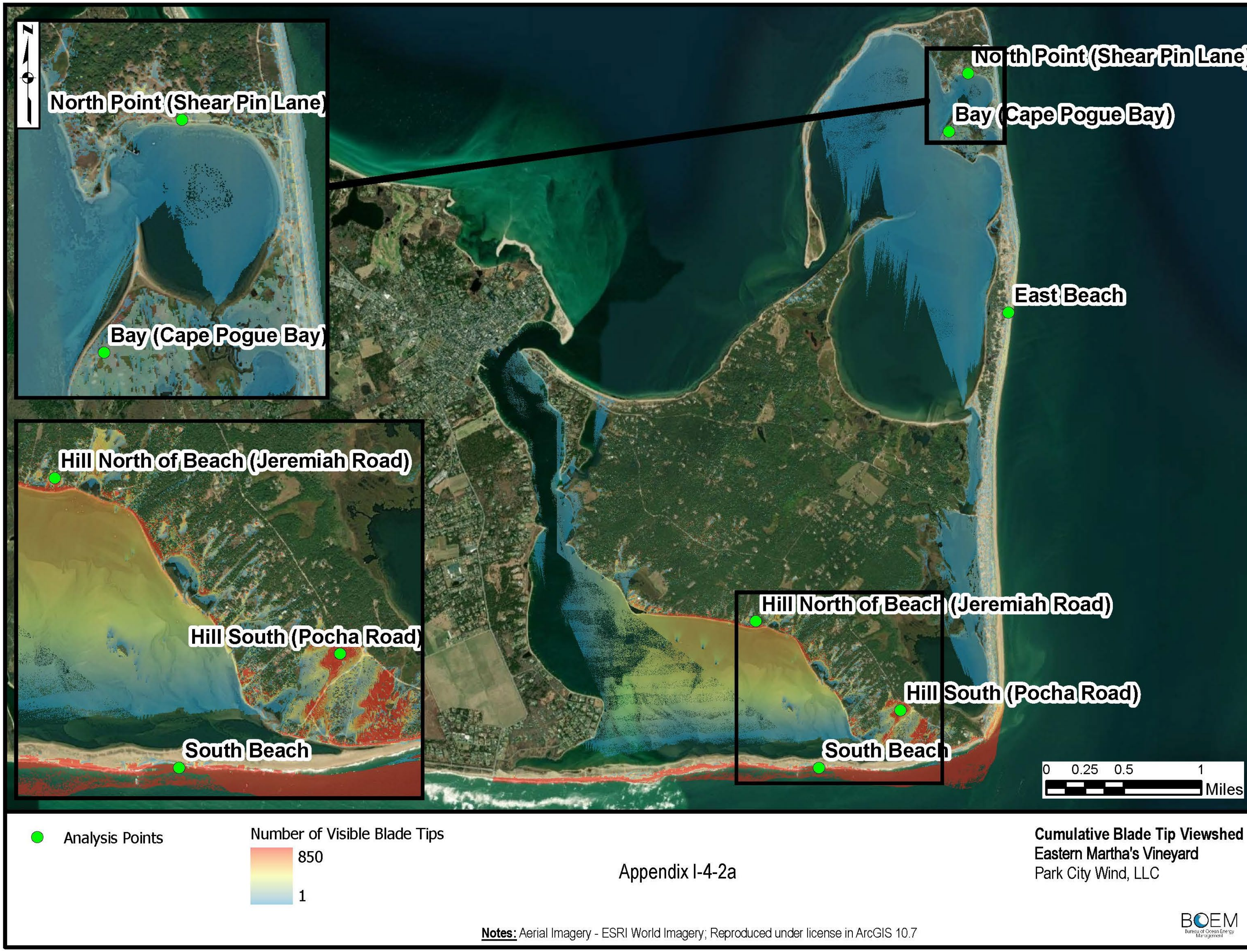
North Point (Shear Pin Lane)
Bay (Cape Pogue Bay)
Hill North of Beach (Jeremiah Road)
Hill South (Pocha Road)
South Beach
East Beach
0 0.25 0.5 1
Miles
Analysis Points
Number of Visible Blade Tips
850
1
Appendix I-4-2a
Cumulative Blade Tip Viewshed
Eastern Martha's Vineyard
Park City Wind, LLC
BOEM
Notes: Aerial Imagery - ESRI World Imagery; Reproduced under license in ArcGIS 10.7


Analysis Point

Number of Visible Nacelles
High: 792
Low: 1

Appendix I-4-2b

**NOTES:**
Water is included in this viewshed model
Aerial Imagery: ESRI World Imagery Reproduced under license in ArcGIS Pro

Cumulative Nacelle Viewshed
Eastern Martha's Vineyard
Park City Wind, LLC

BOEM

F:\NewEngland_Wind2022\Maps\App_A4_Chappa_VIA_Nacelle_08102022.aprx - Sebastian.Gerbaudo - 9/22/2022


N
Muskeget Beach
Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-3a
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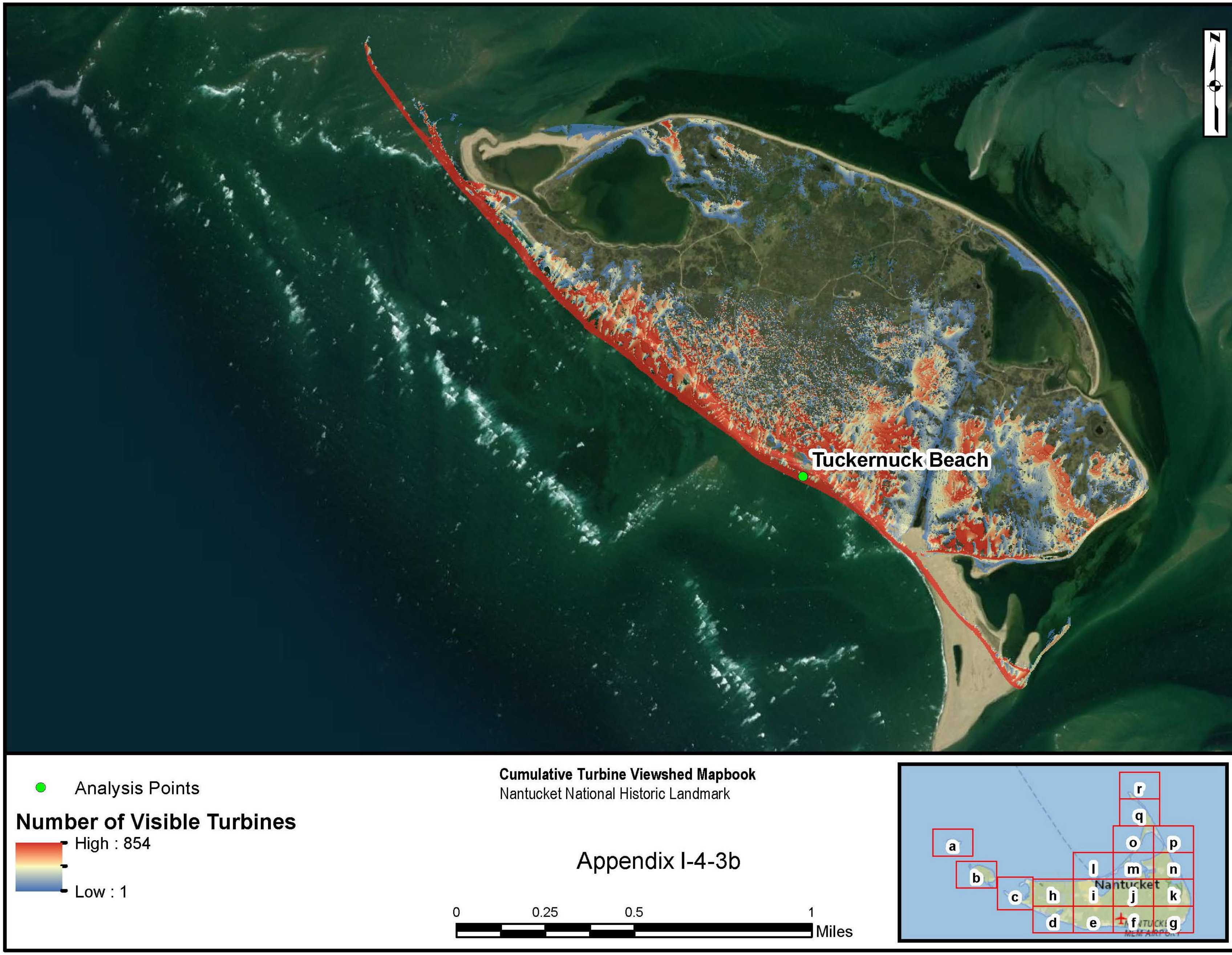
Nantucket

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South Beach West
Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-3c
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Nantucket
F:\NewEngland_Wind2022\Maps\NAN_Mapbook_Nacelle_05192020.mxd - Sebastian.Gerbaudo - 8/11/2022


Hill West
Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-3d
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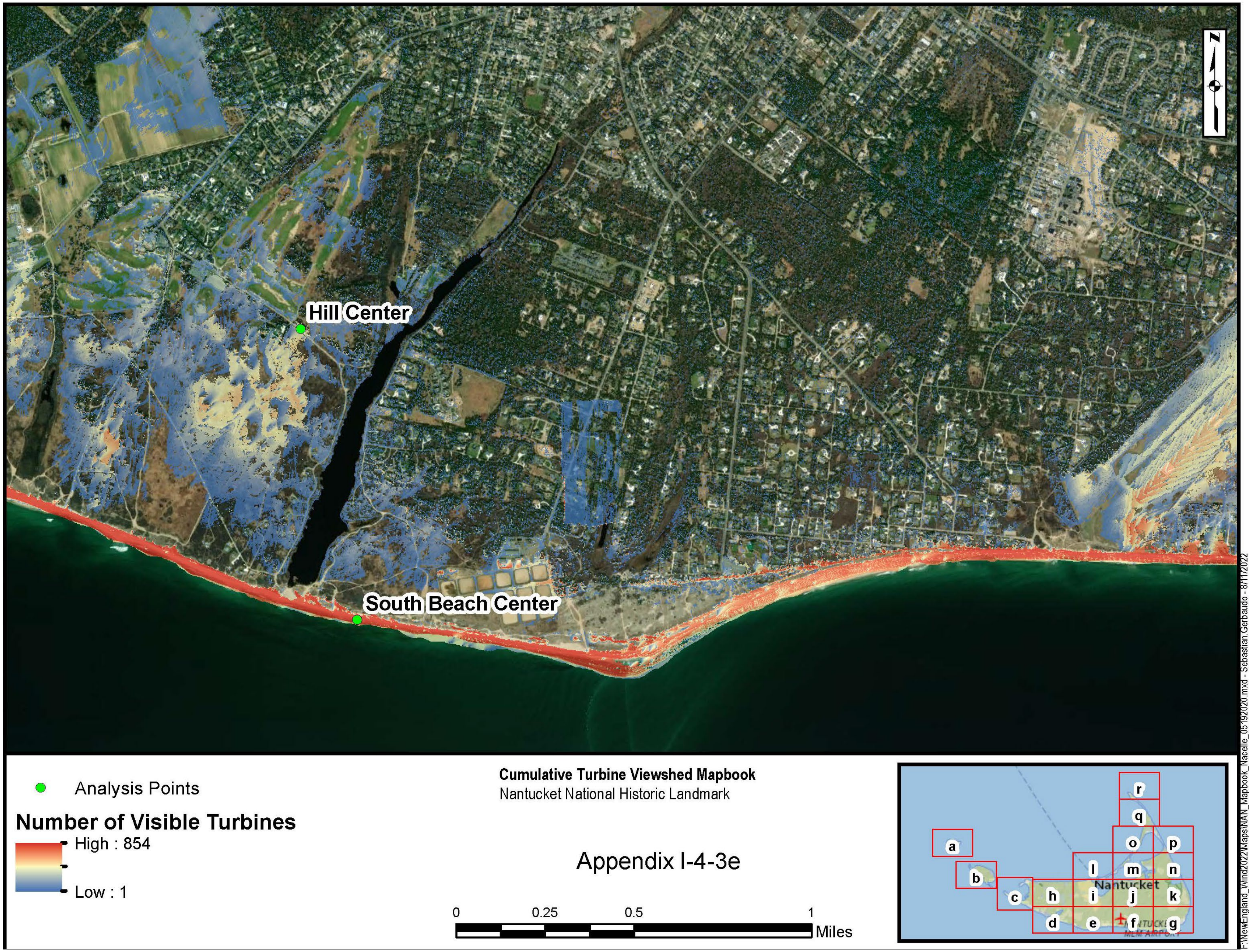
Hill Center
South Beach Center
Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
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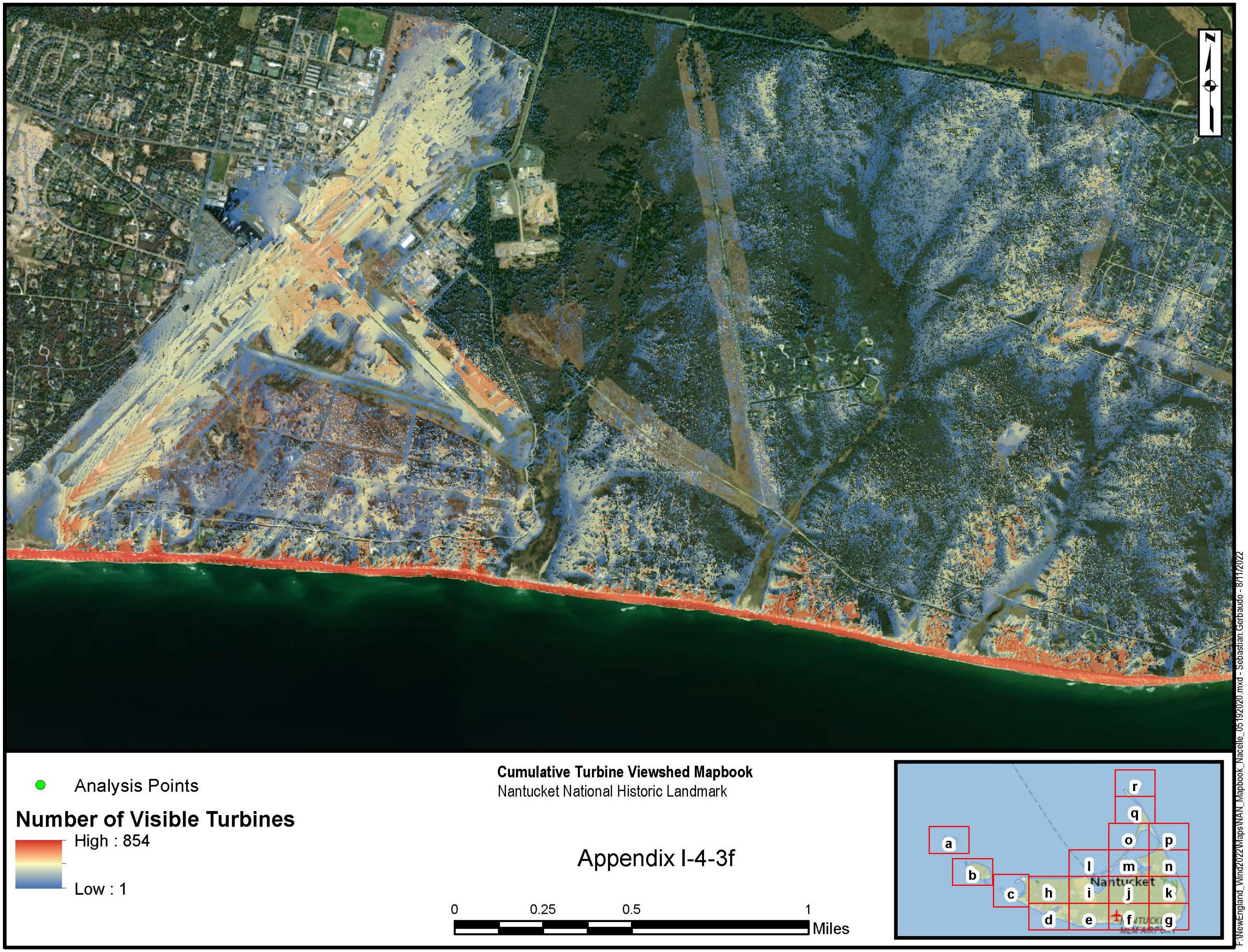
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High : 854
Low : 1
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Nantucket National Historic Landmark
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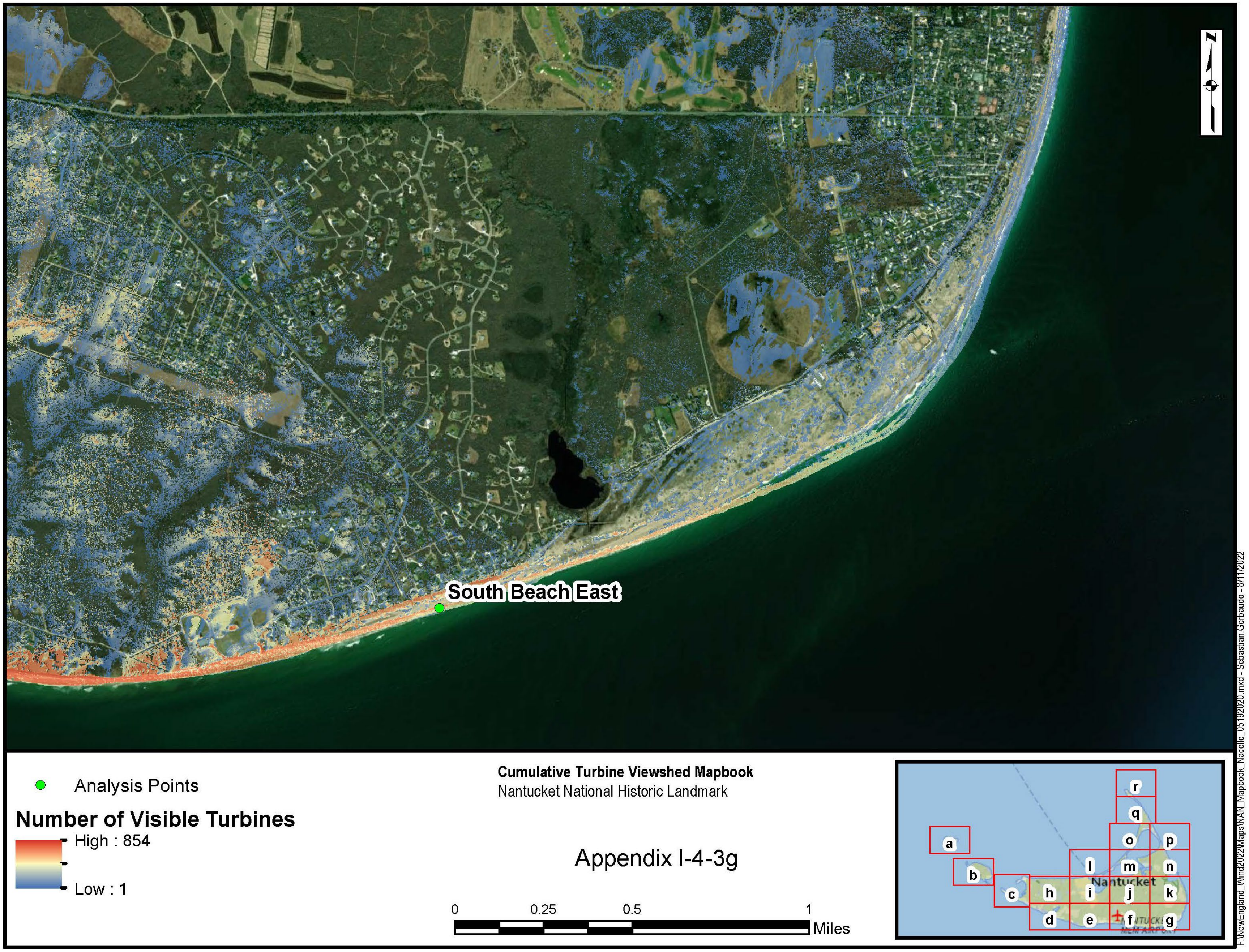


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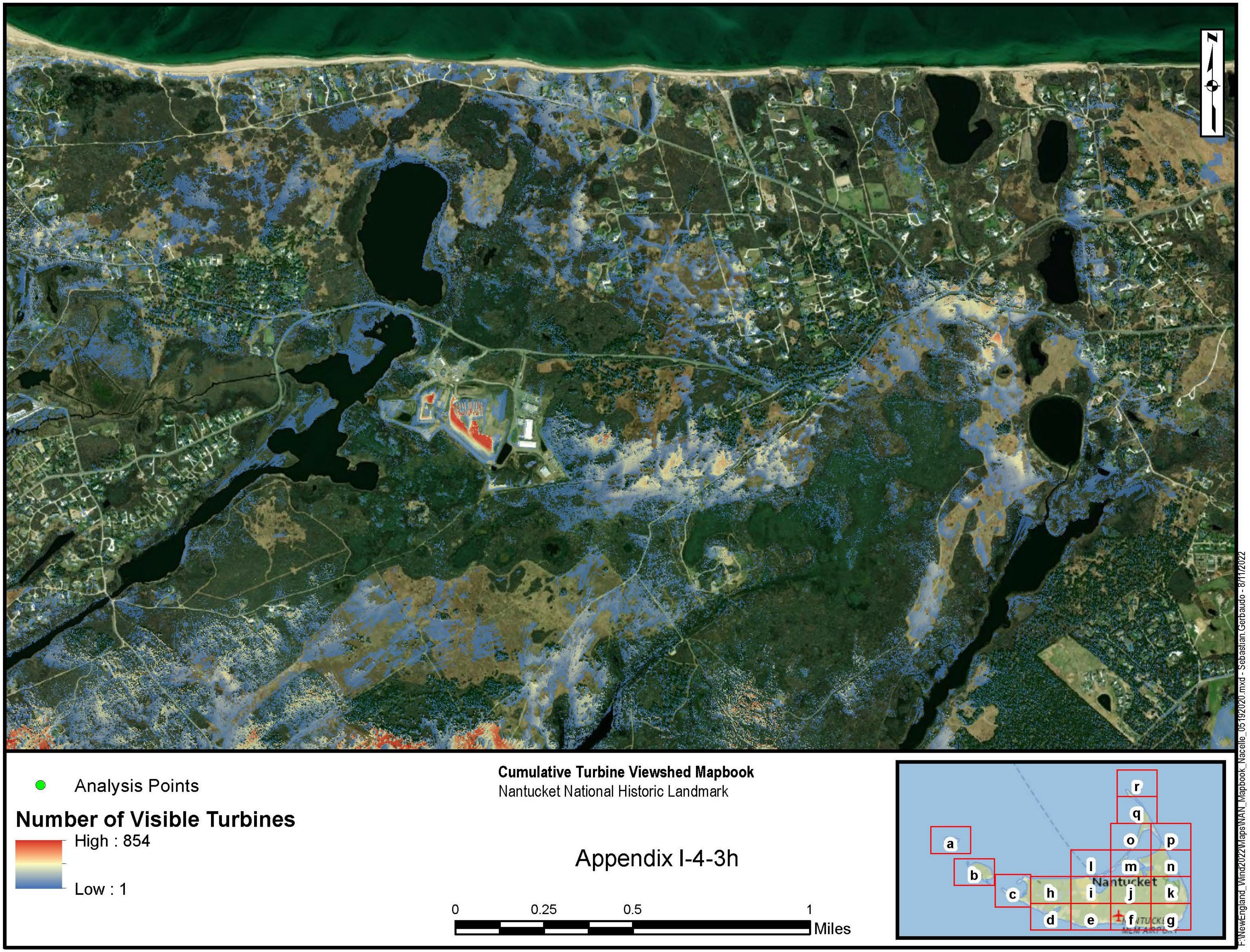
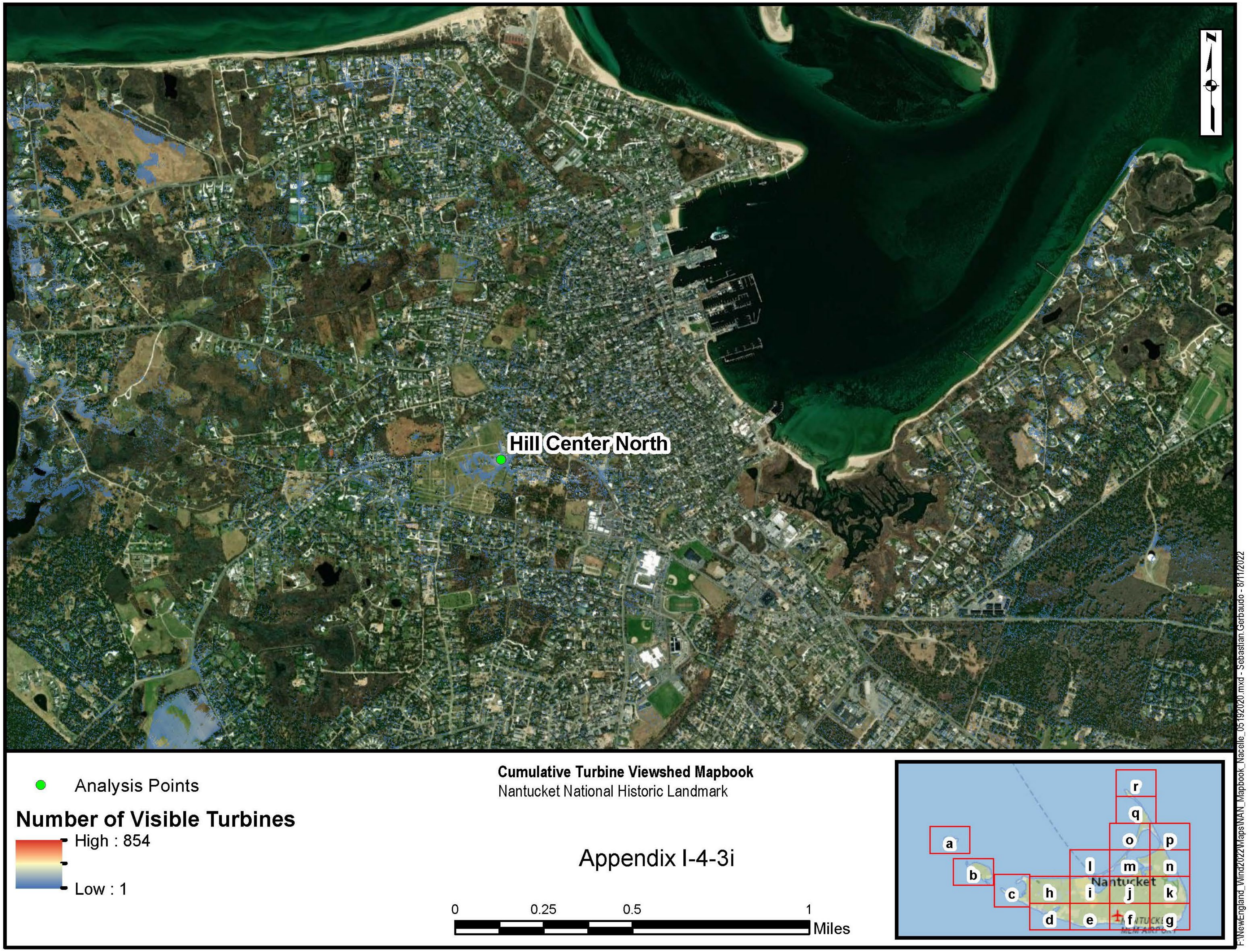



Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark

Appendix I-4-3h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Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
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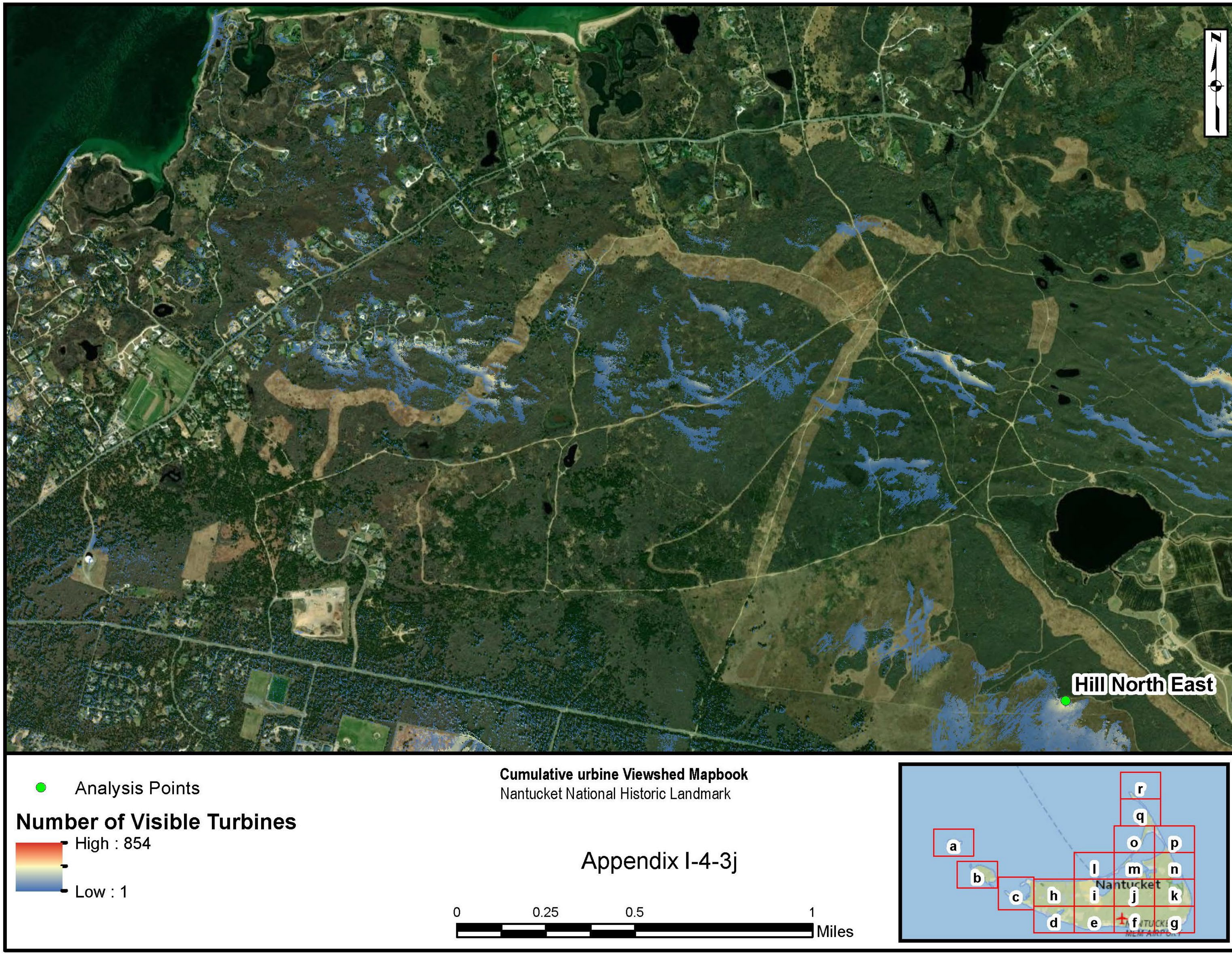


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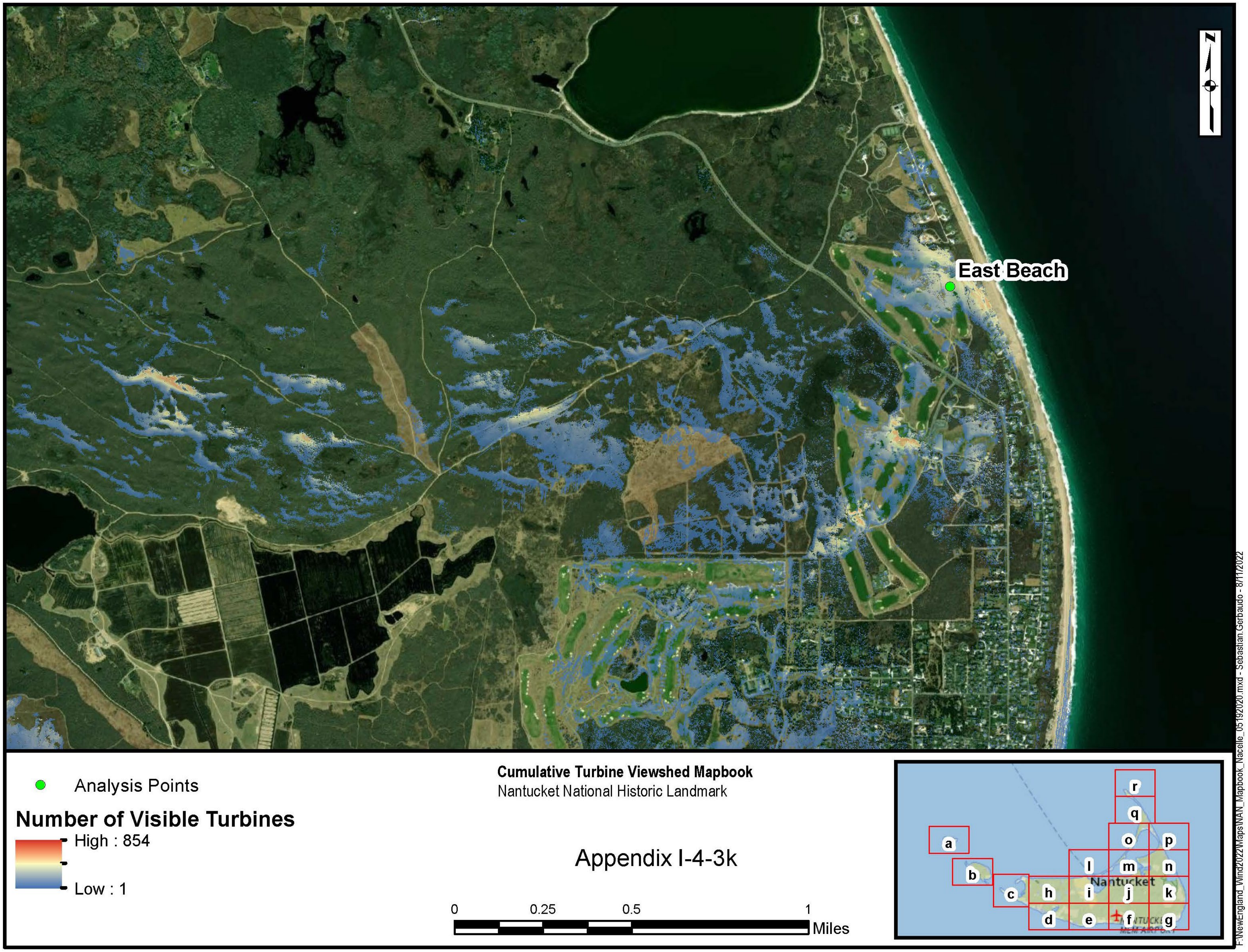
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Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
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Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-3l
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N
Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-3m
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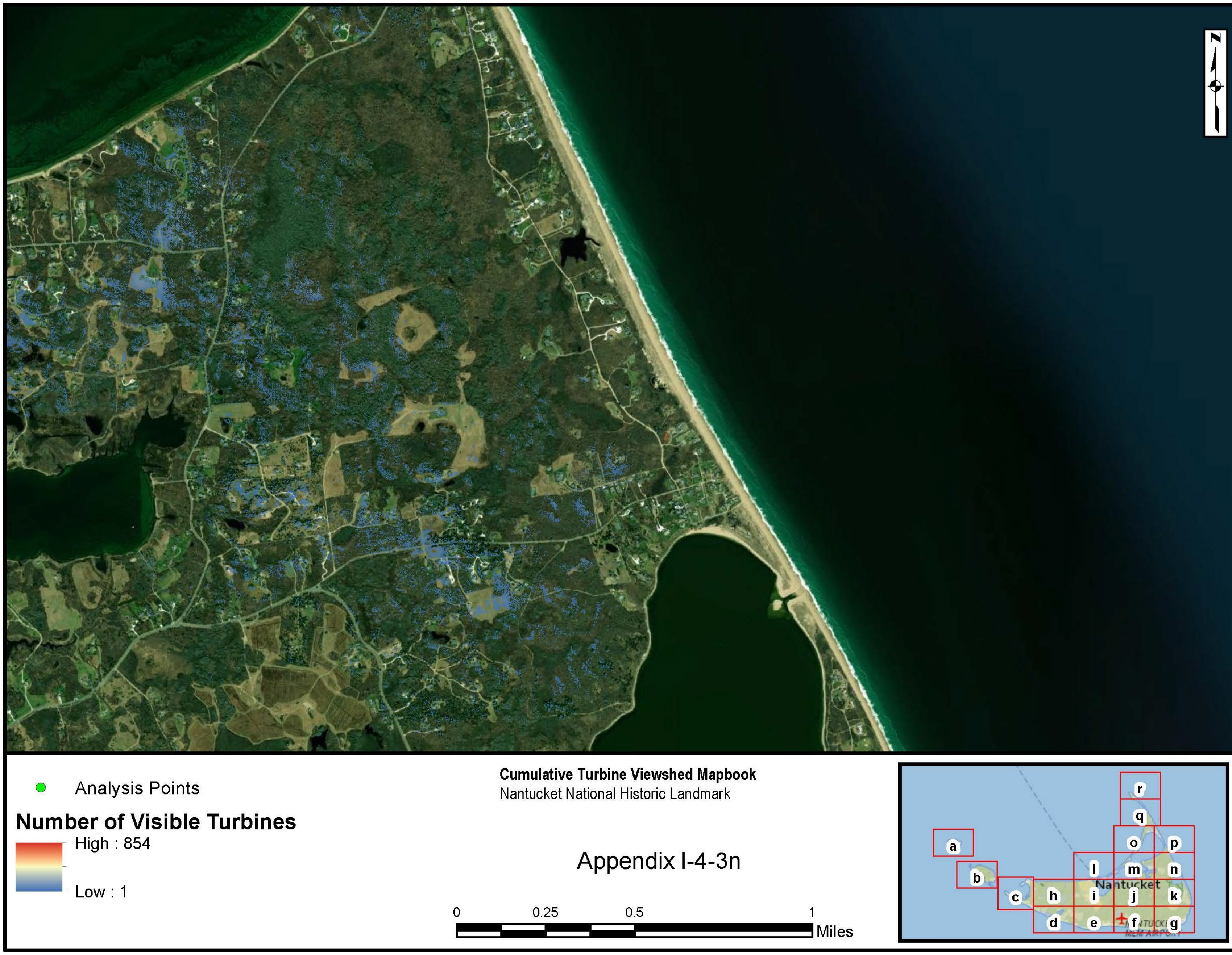


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Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
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North Isthmus
Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
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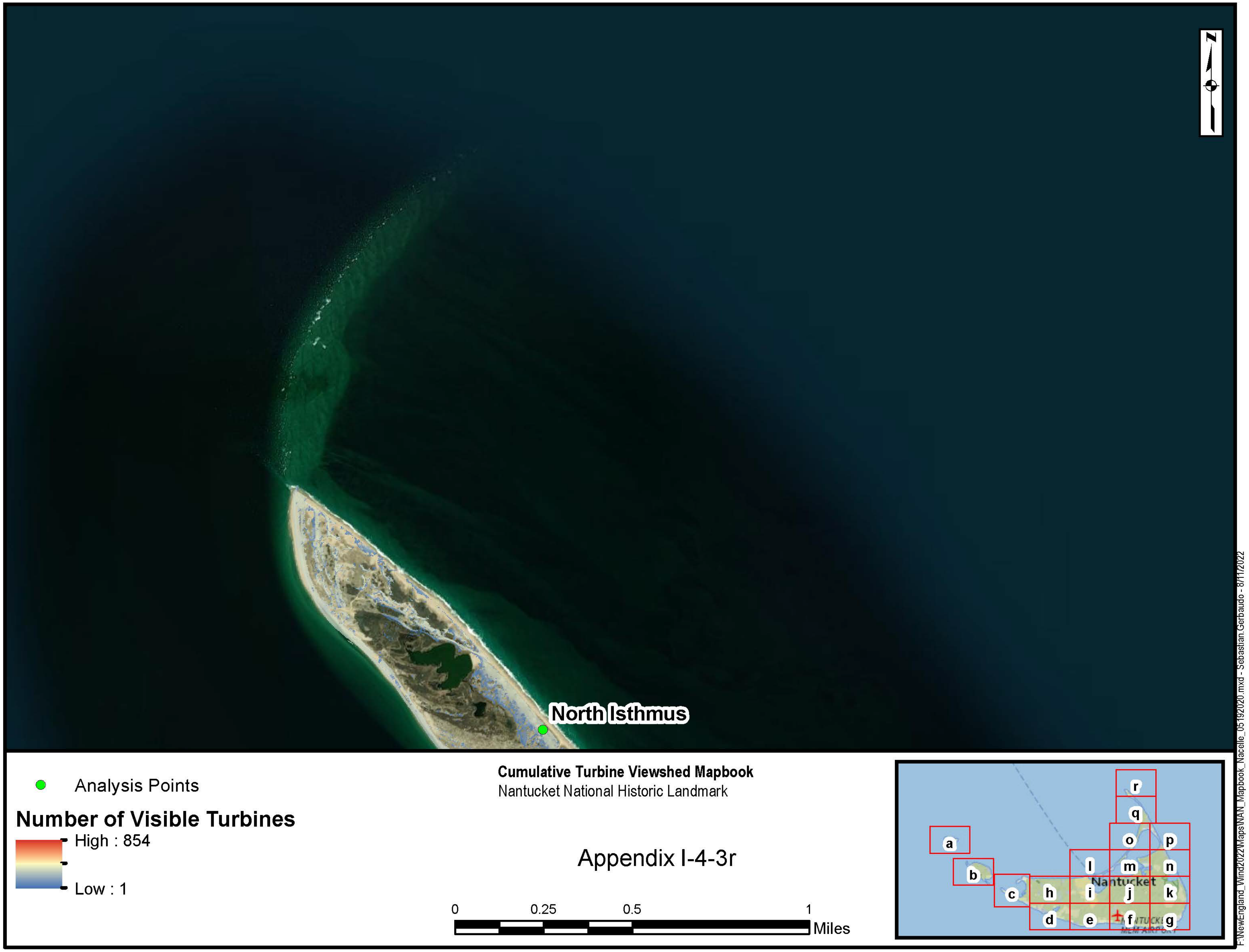
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Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
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Muskeget Beach
Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-4a
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Nantucket


Tuckernuck Beach
Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
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**Cumulative Nacelle Viewshed Mapbook**
Nantucket National Historic Landmark

Appendix I-4-4c

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Hill West
N
Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-4d
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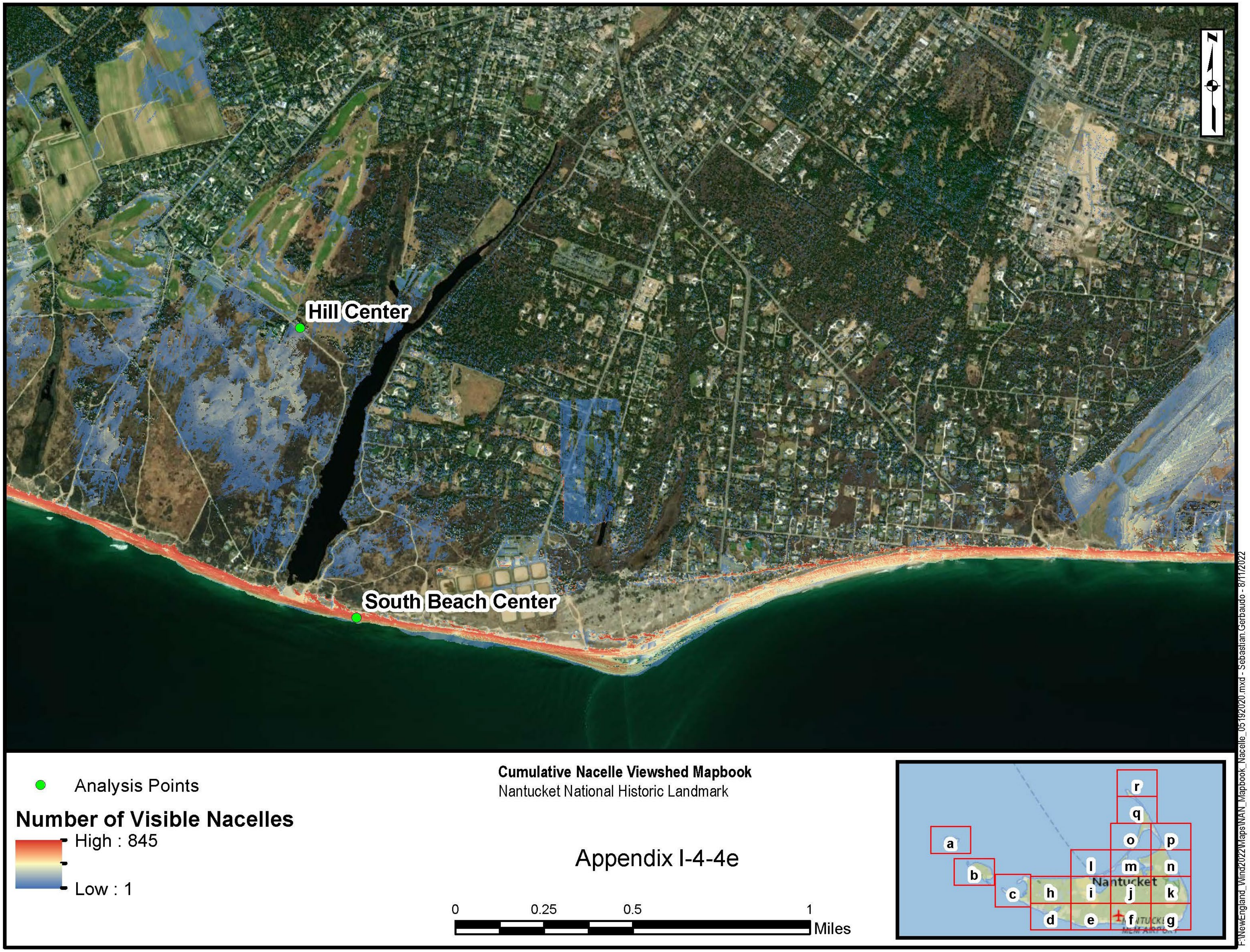
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South Beach Center
Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
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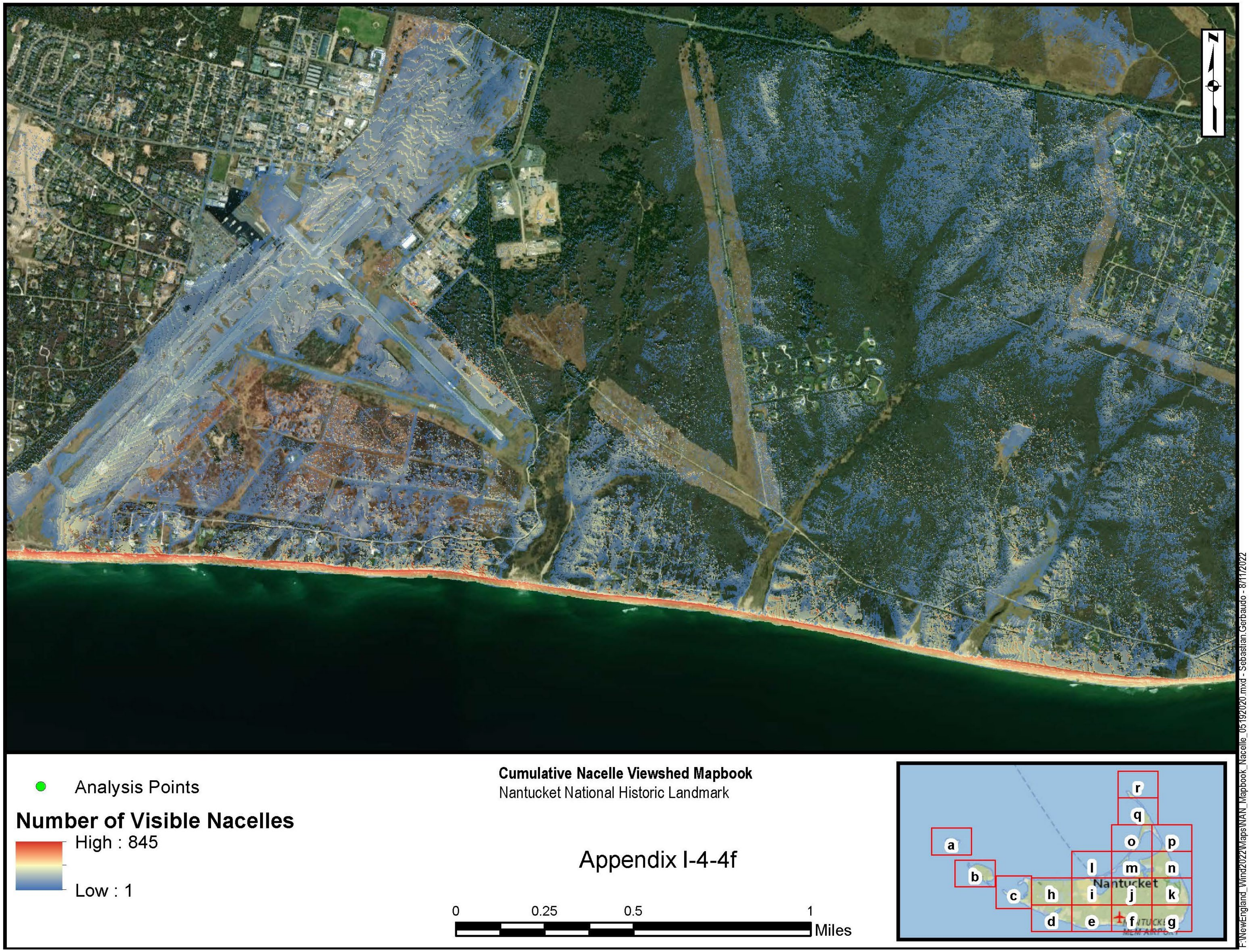
Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
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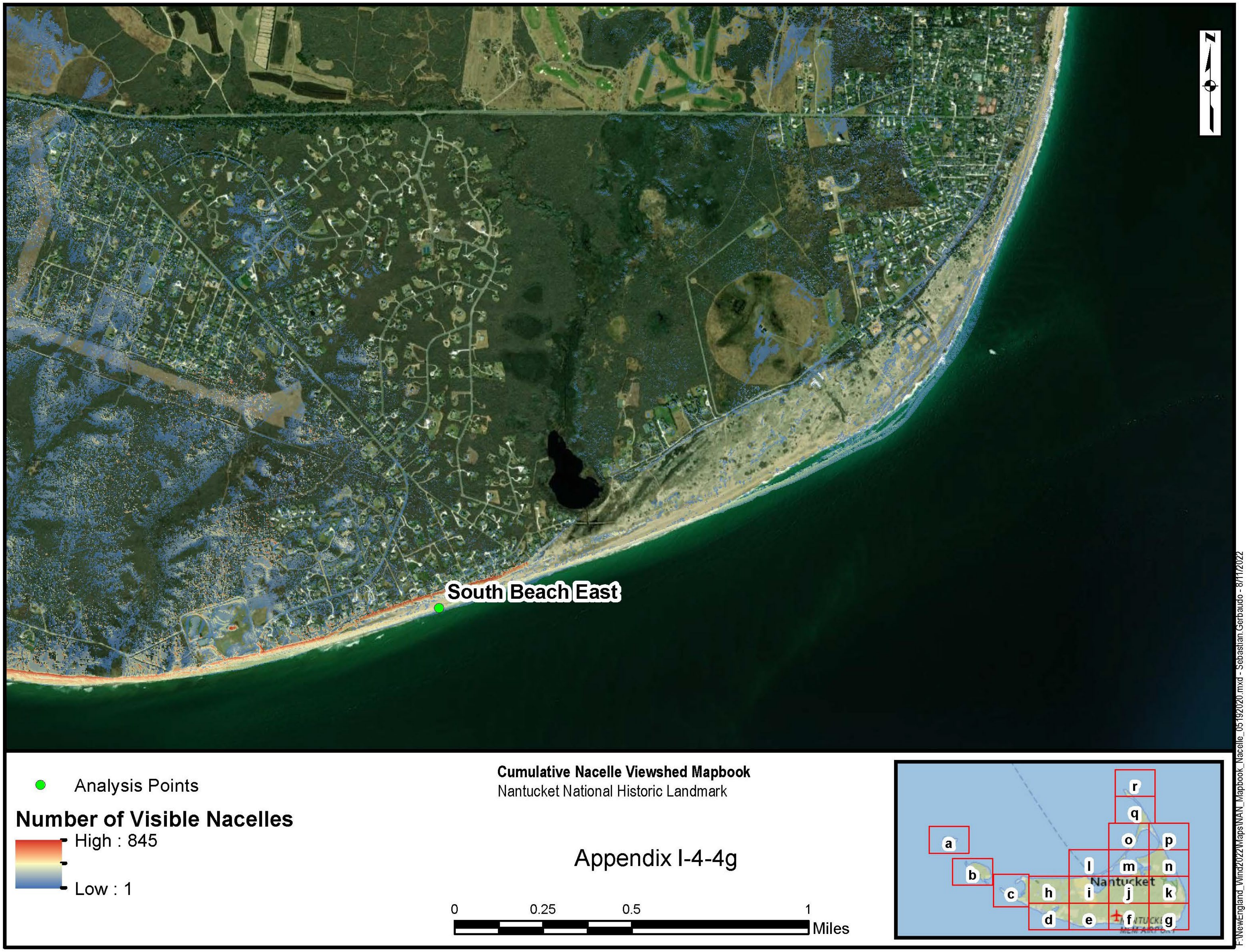
South Beach East
Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
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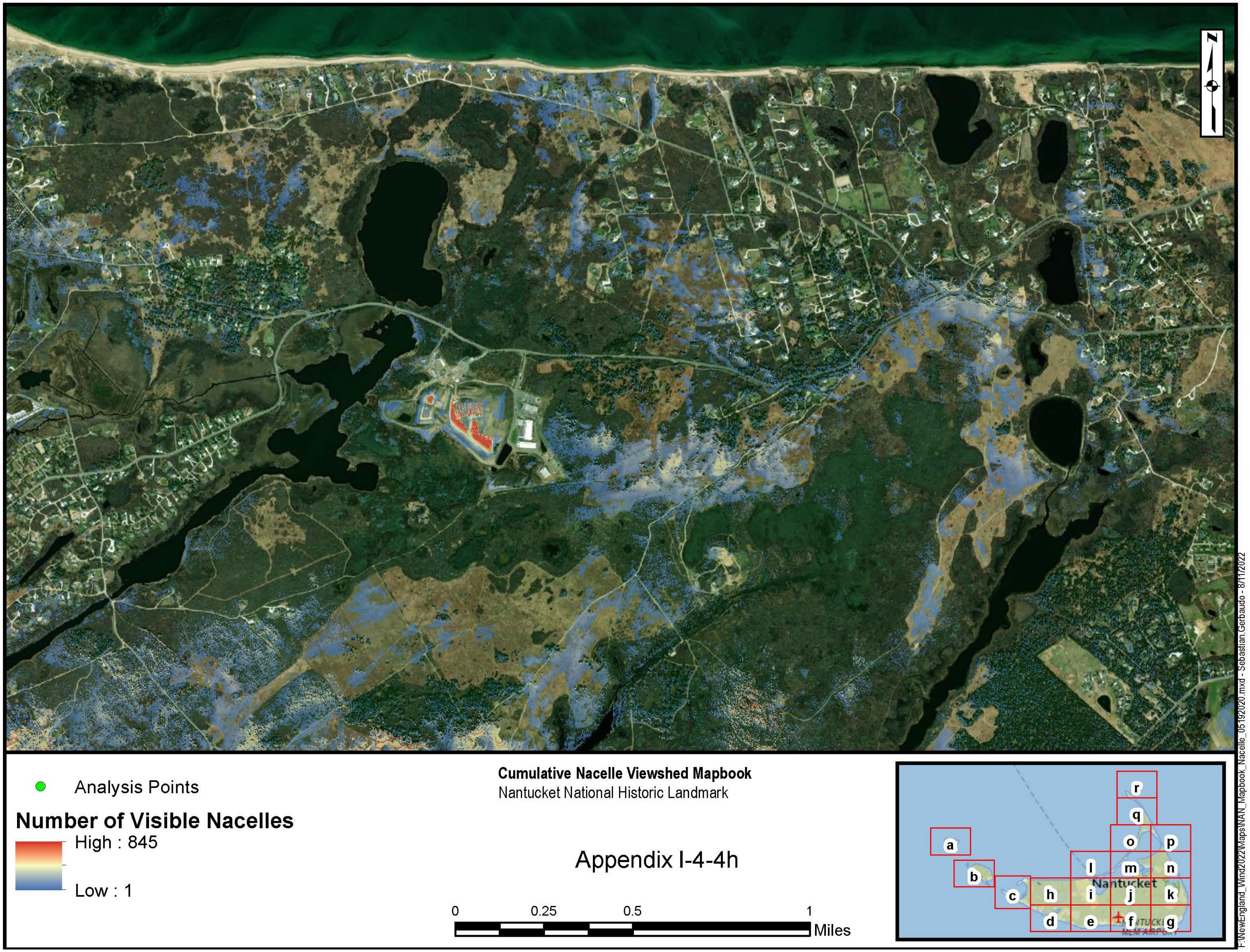
Nantucket


Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-4h
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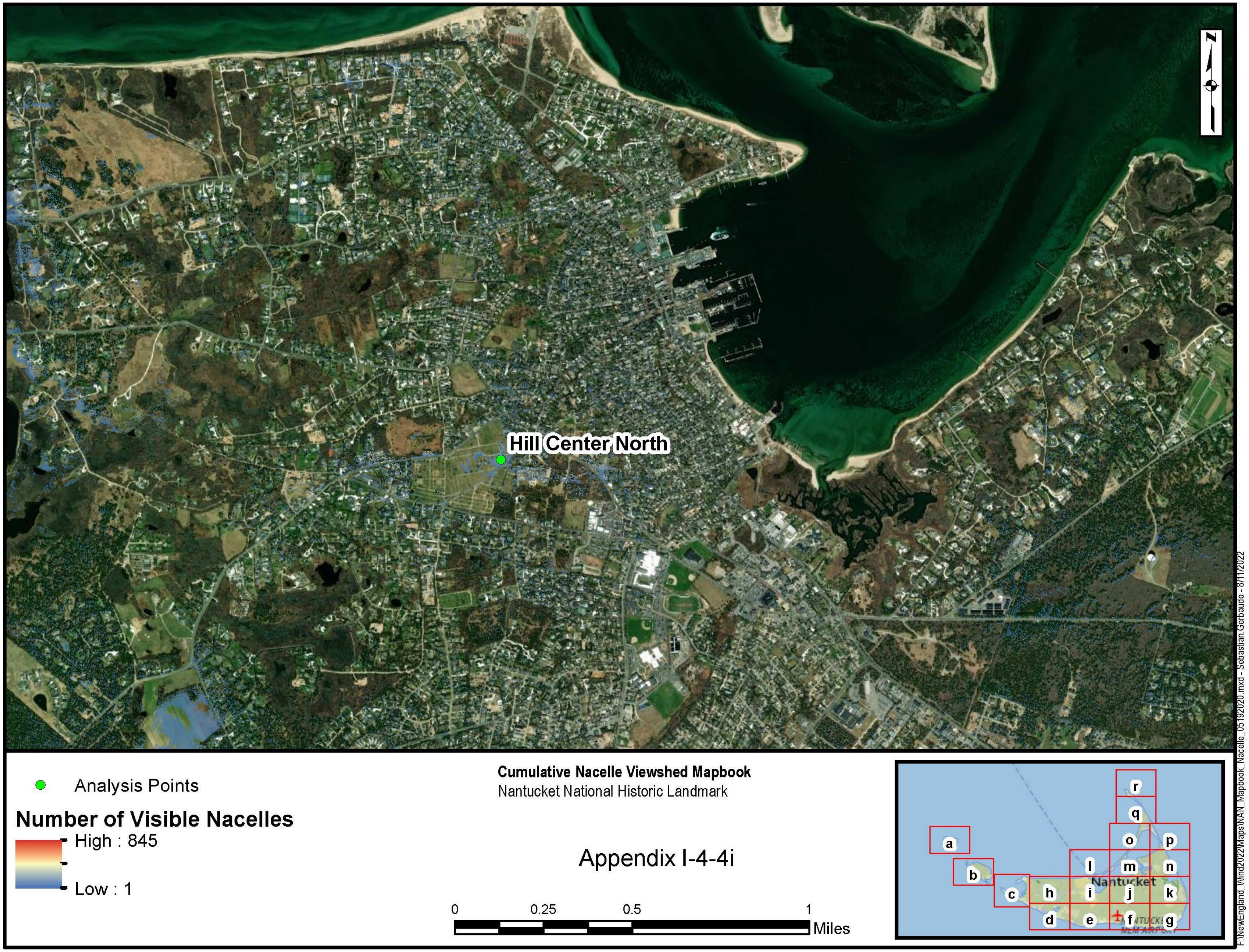
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Hill Center North
Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-4i
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Miles
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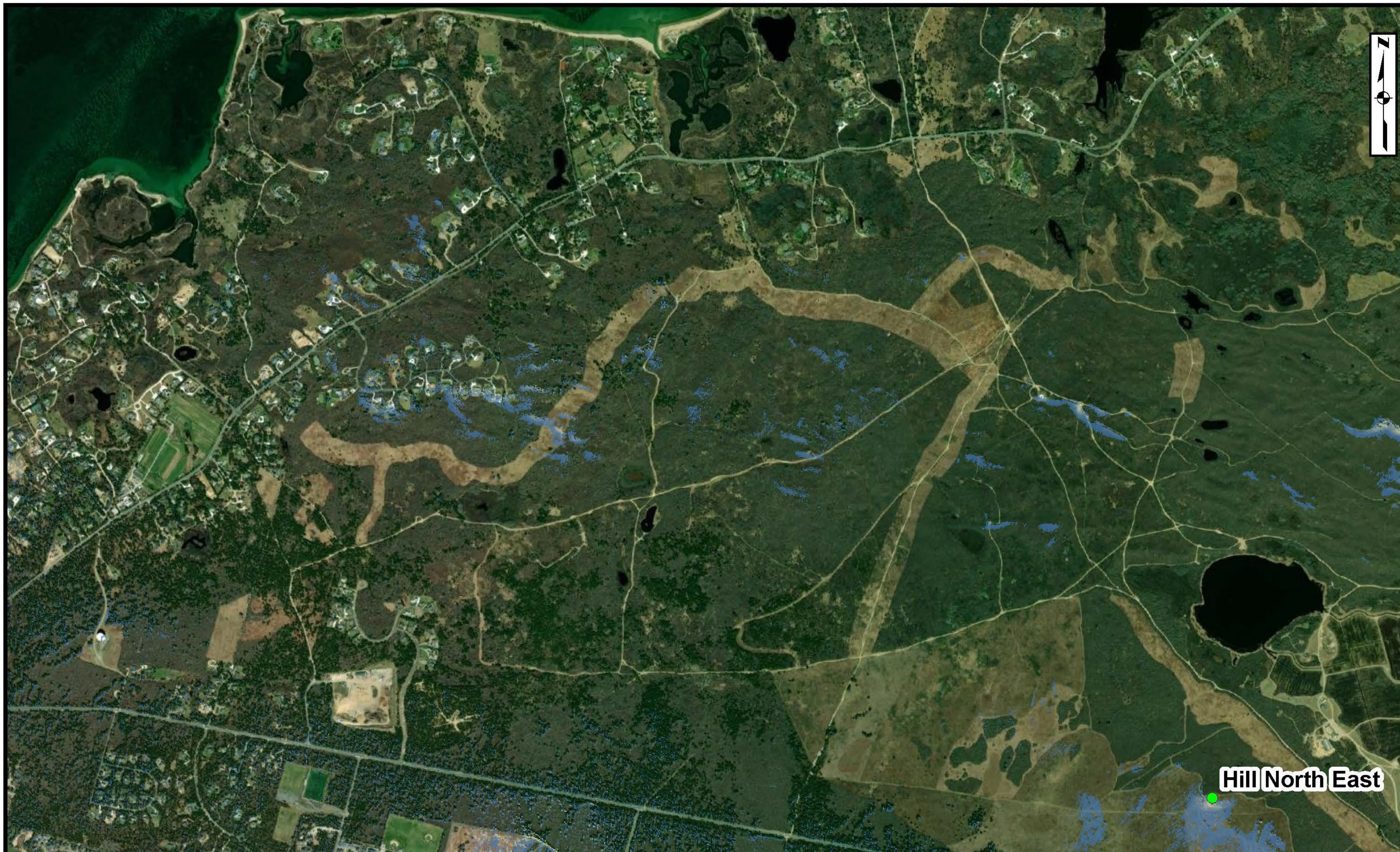



Analysis Points

**Number of Visible Nacelles**

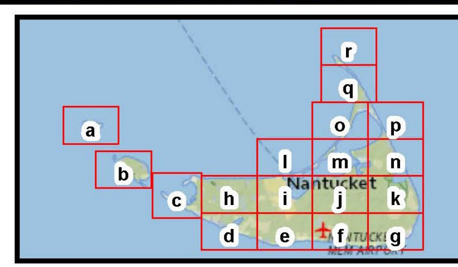
High : 845

Low : 1

**Cumulative Nacelle Viewshed Mapbook**
Nantucket National Historic Landmark

Appendix I-4-4j

0 0.25 0.5 1 Miles

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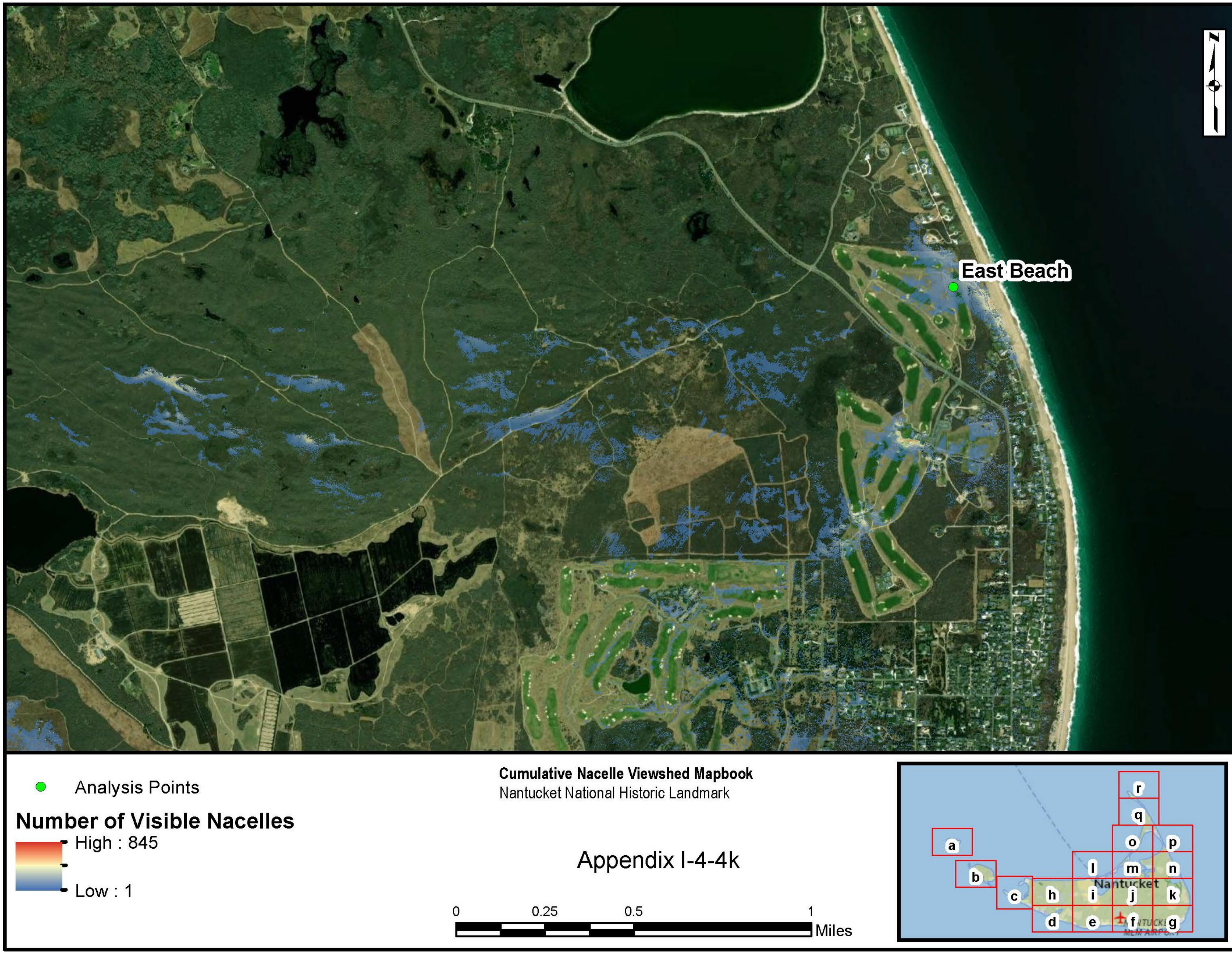


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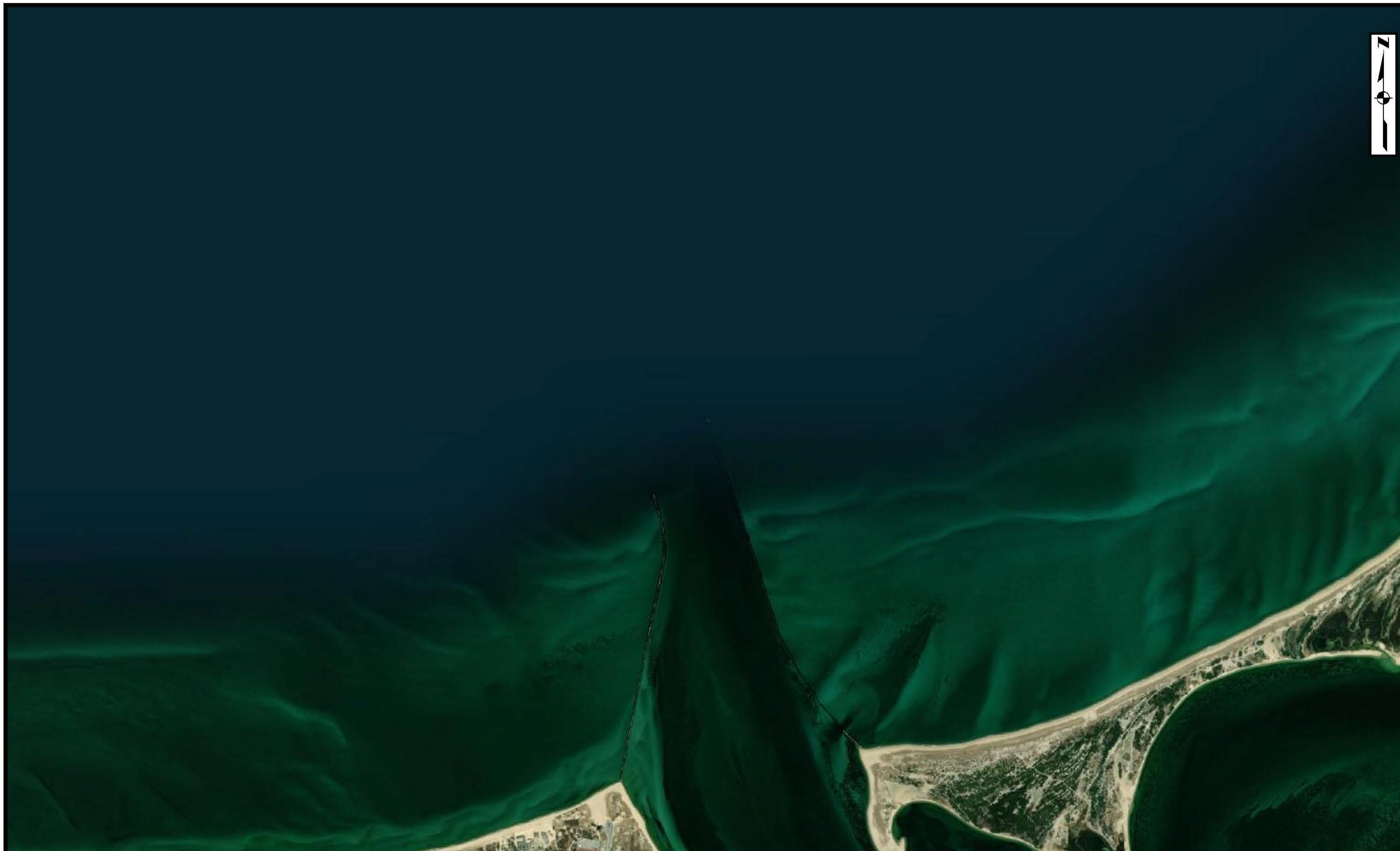


Analysis Points

**Number of Visible Nacelles**

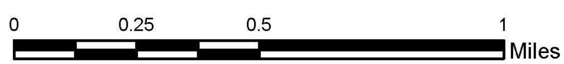
High : 845

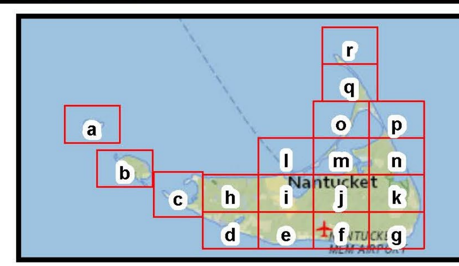
Low : 1

**Cumulative Nacelle Viewshed Mapbook**

Nantucket National Historic Landmark

Appendix I-4-4l

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Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-4m
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Miles
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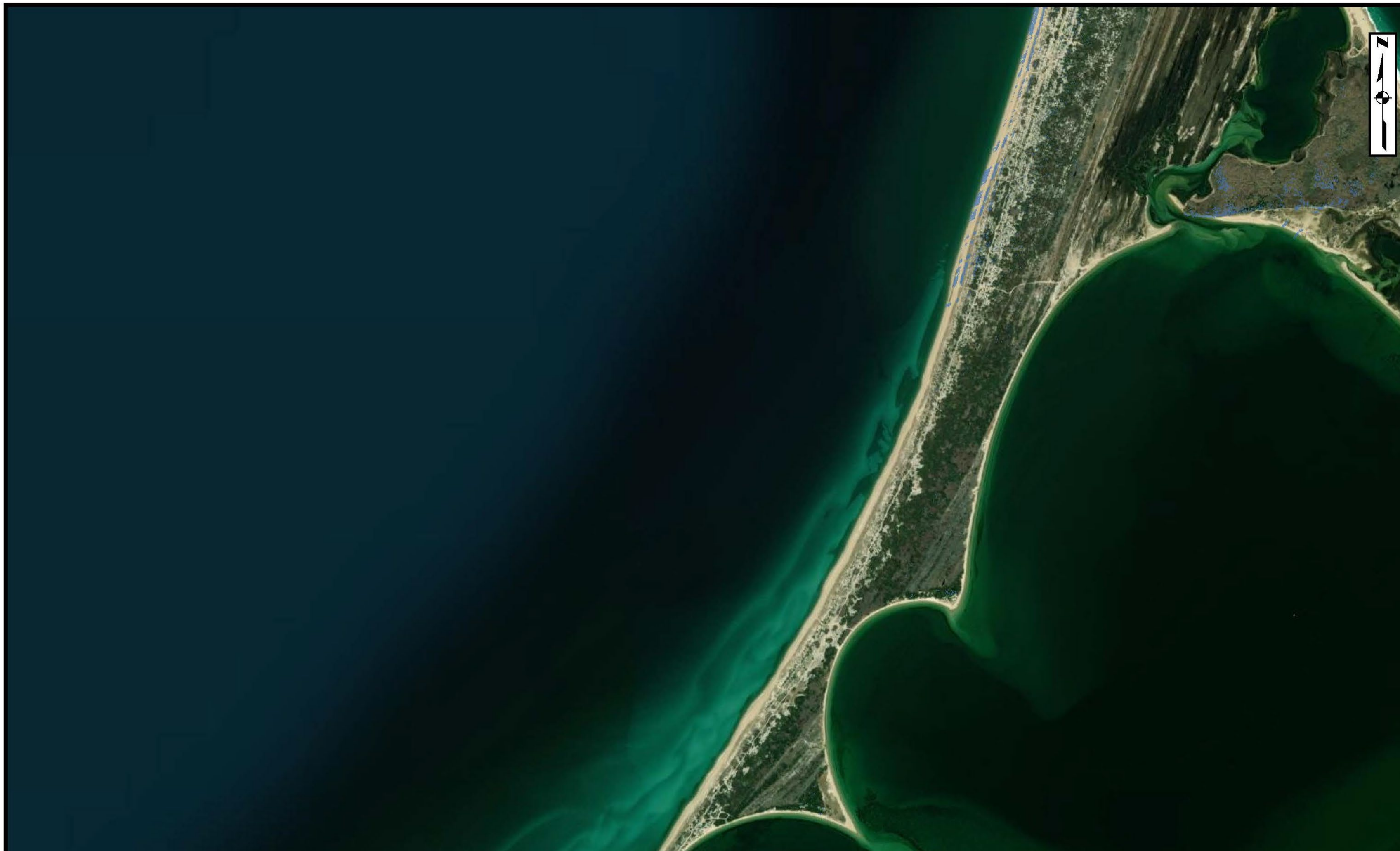
Appendix I-4-4n



Analysis Points

**Number of Visible Nacelles**

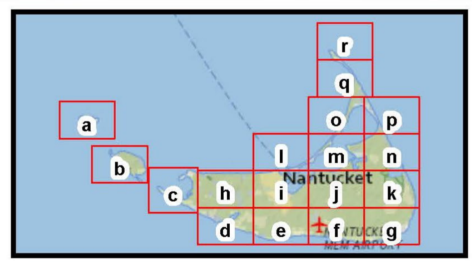
High : 845

Low : 1

**Cumulative Nacelle Viewshed Mapbook**
Nantucket National Historic Landmark

Appendix I-4-4o

0 0.25 0.5 1 Miles

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Appendix I-4-4p

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North Isthmus
N
Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-4q
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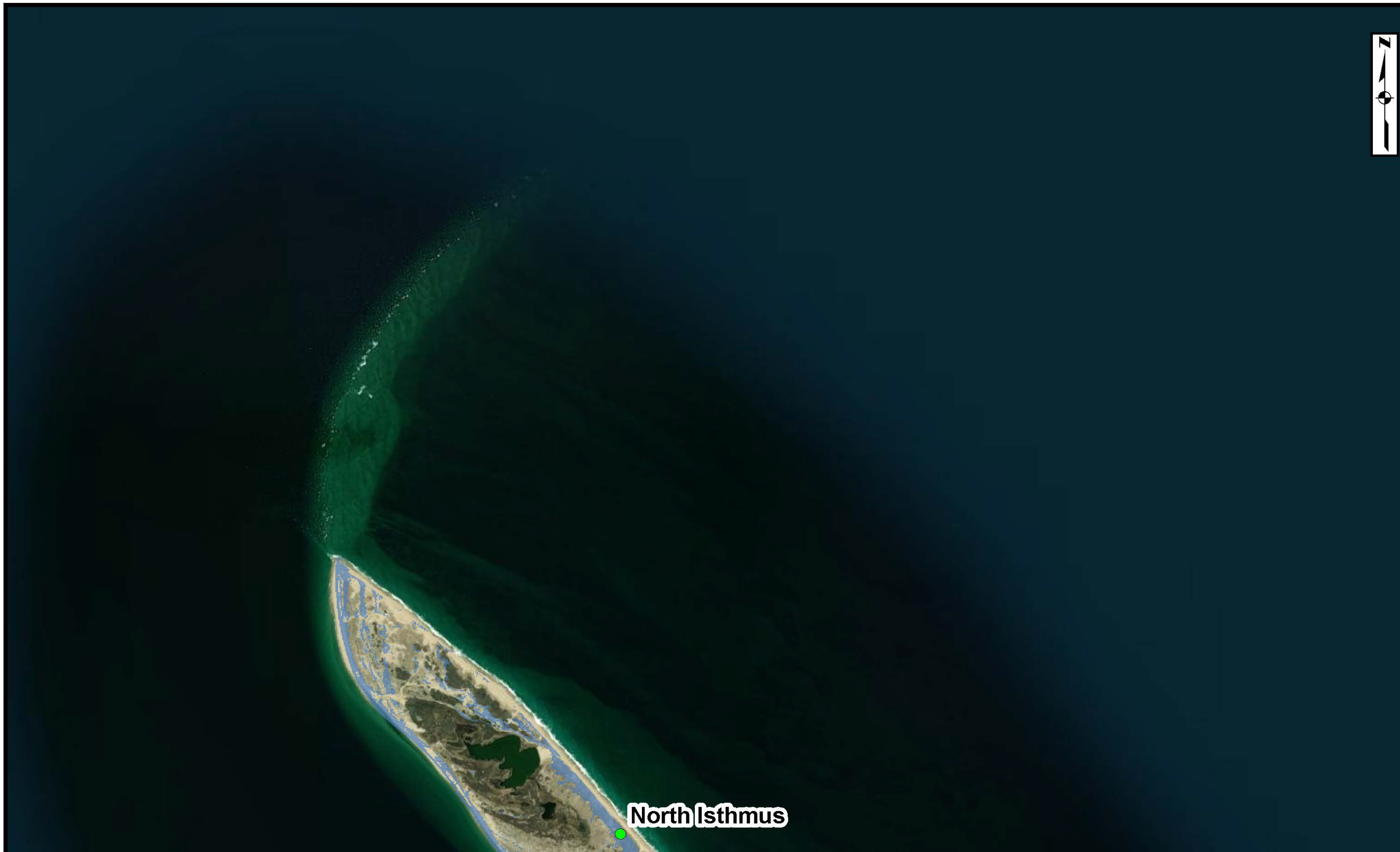
Nantucket
F:\NewEngland_Wind2022\Maps\NAN_Mapbook_Nacelle_05192020.mxd - Sebastian.Gerbaudo - 8/11/2022




● Analysis Points

**Number of Visible Nacelles**

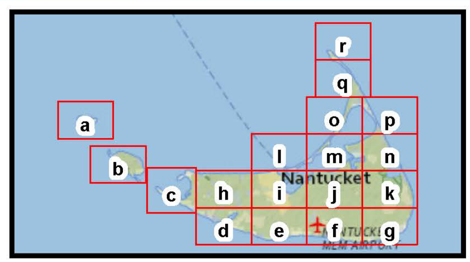
High : 845

Low : 1

**Cumulative Nacelle Viewshed Mapbook**
Nantucket National Historic Landmark

Appendix I-4-4r

0 0.25 0.5 1 Miles

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# Appendix J
# Finding of Adverse Effect for the New England Wind Project Construction and Operations Plan

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## Table of Contents



## List of Tables



## List of Figures

## List of Attachments



## Abbreviations and Acronyms

| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| ADLS | aircraft detection and lighting system |
| APE | area of potential effects |
| BOEM | Bureau of Ocean Energy Management |
| CFR | Code of Federal Regulations |
| COP | construction and operations plan |
| EIS | environmental impact report |
| ESP | electrical service platform |
| ft | feet |
| mi | mile |
| MOA | Memorandum of Agreement |
| MW | megawatt |
| NEPA | National Environmental Policy Act |
| NHL | National Historic Landmark |
| NHPA | National Historic Preservation Act |
| NOI | Notice of Intent |
| NPR | National Park Service |
| NRHP | National Register of Historic Places |
| OCS | Outer Continental Shelf |
| OECC | offshore export cable corridor |
| OECR | onshore export cable route |
| Q&A | questions and answers |
| ROW | right-of-way |
| SCV | South Coast Variant |
| SFH | Shootflying Hill |
| SHPO | State Historic Preservation Officer |
| SWDA | Southern Wind Development Area |
| TCP | traditional cultural property |
| USC | U.S. Code |
| WTG | wind turbine generator |
| ZVI | zone of visual influence |

# J Finding of Adverse Effect for the New England Wind Project Construction and Operations Plan

The Bureau of Ocean Energy Management (BOEM) has made a Finding of Adverse Effect (Finding) under Section 106 of the National Historic Preservation Act (NHPA) pursuant to Code of Federal Regulations, Title 36, Section 800.5 (36 CFR § 800.5) for the New England Wind Project (proposed Project), consisting of construction and installation (construction), operations and maintenance (operations), and conceptual decommissioning (decommissioning) of an offshore wind energy project, as described in the proposed Project's Construction and Operations Plan (COP). BOEM finds that the undertaking would adversely affect the following historic properties:

- Gay Head Lighthouse;
- Nantucket Historic District National Historic Landmark (Nantucket District NHL);
- Chappaquiddick Island traditional cultural property (TCP);
- Moshup's Bridge and Vineyard Sound TCP;
- Nantucket Sound TCP, including 19 ancient submerged landform features that contribute to the TCP;
- Edwin Vanderhoop Homestead (Aquinnah Cultural Center);
- Gay Head–Aquinnah Shops Area; and
- 33 ancient submerged landform features on the Outer Continental Shelf (OCS) outside of these TCPs.

Resolution of adverse effects on historic properties will be codified through a Memorandum of Agreement (MOA) pursuant to 36 CFR § 800.6(c) (see Attachment J-1).

## J.1 Description of the Undertaking

In the proposed Project COP (originally submitted on June 2, 2020, and comprehensively revised in December 2021 and April and May 2022), Park City Wind, LLC (Park City Wind or the applicant) proposes construction, operations, and decommissioning of an offshore wind energy project that would generate at least 2,036 megawatts (MW) and up to 2,600 MW of wind energy in two phases within BOEM Renewable Energy Lease Area OCS-A 0534 and potentially a portion of Lease Area OCS-A 0501,[1] hereafter together referenced as the Southern Wind Development Area (SWDA) (Figures J-1 and J-2). If approved by BOEM, the applicant would construct and operate wind turbine generators (WTG) and electrical service platforms (ESP), an export cable to shore, and associated facilities for a 30-year term. BOEM is conducting its environmental and technical reviews of the COP (Epsilon 2022) under the National Environmental Policy Act (NEPA) for its decision regarding approval, disapproval, or approval with modifications of the proposed Project COP. The Draft Environmental Impact Statement (EIS) and COP for the proposed Project are available on the Project-specific website (https://www.boem.gov/renewable-energy/state-activities/new-england-wind-formerly-vineyard-wind-south). The EIS considers the potential impacts of the proposed Project, including impacts on cultural resources.

[1] The developer of the Vineyard Wind 1 Project (Vineyard Wind 1, LLC) will assign spare or extra positions in the southwestern portion of OCS-A 0501 to the applicant for the proposed Project if those positions are not developed as part of the Vineyard Wind 1 Project.

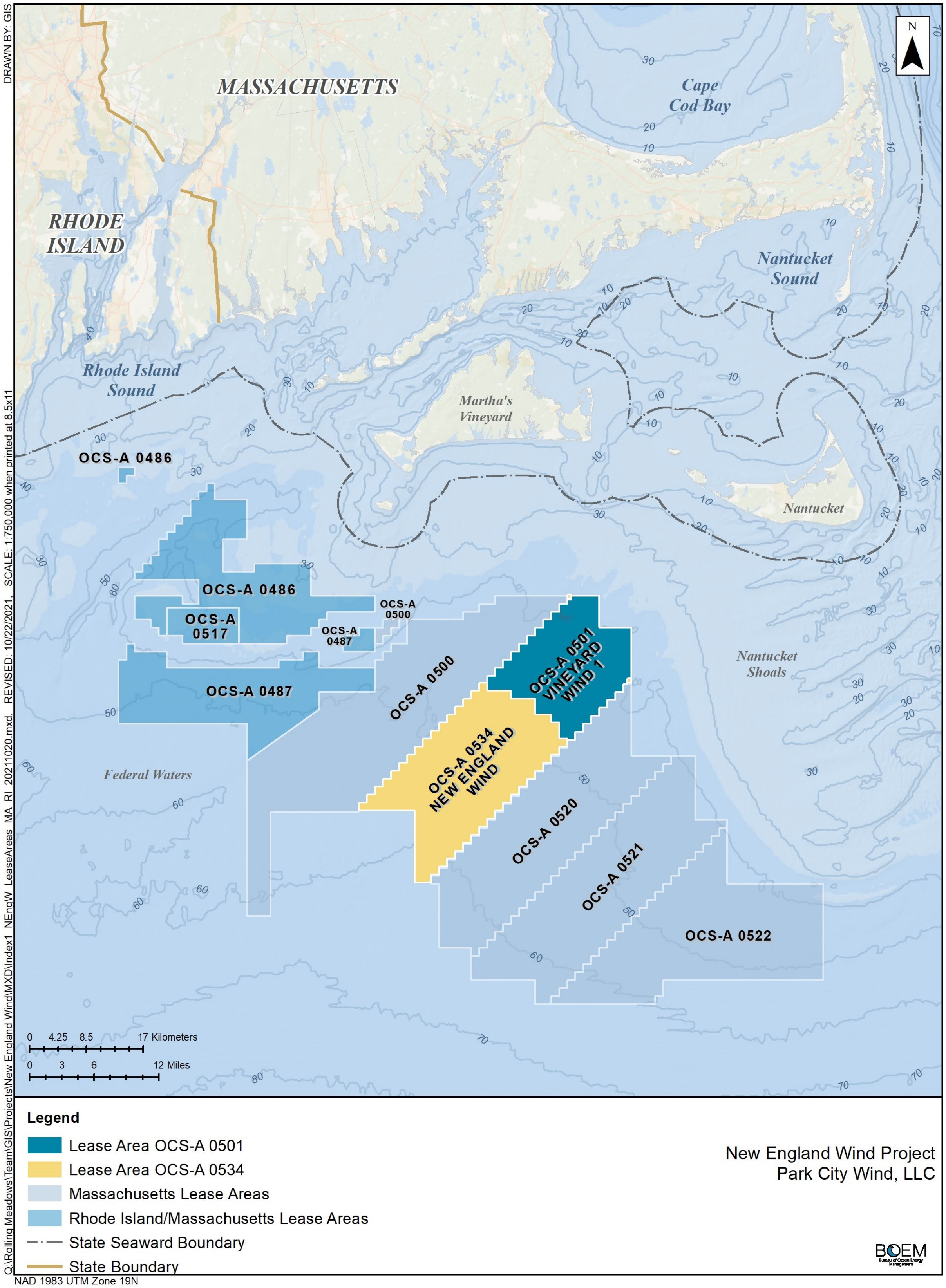


**Figure J-1: Proposed Wind Development Area Relative to Rhode Island and Massachusetts Lease Areas**

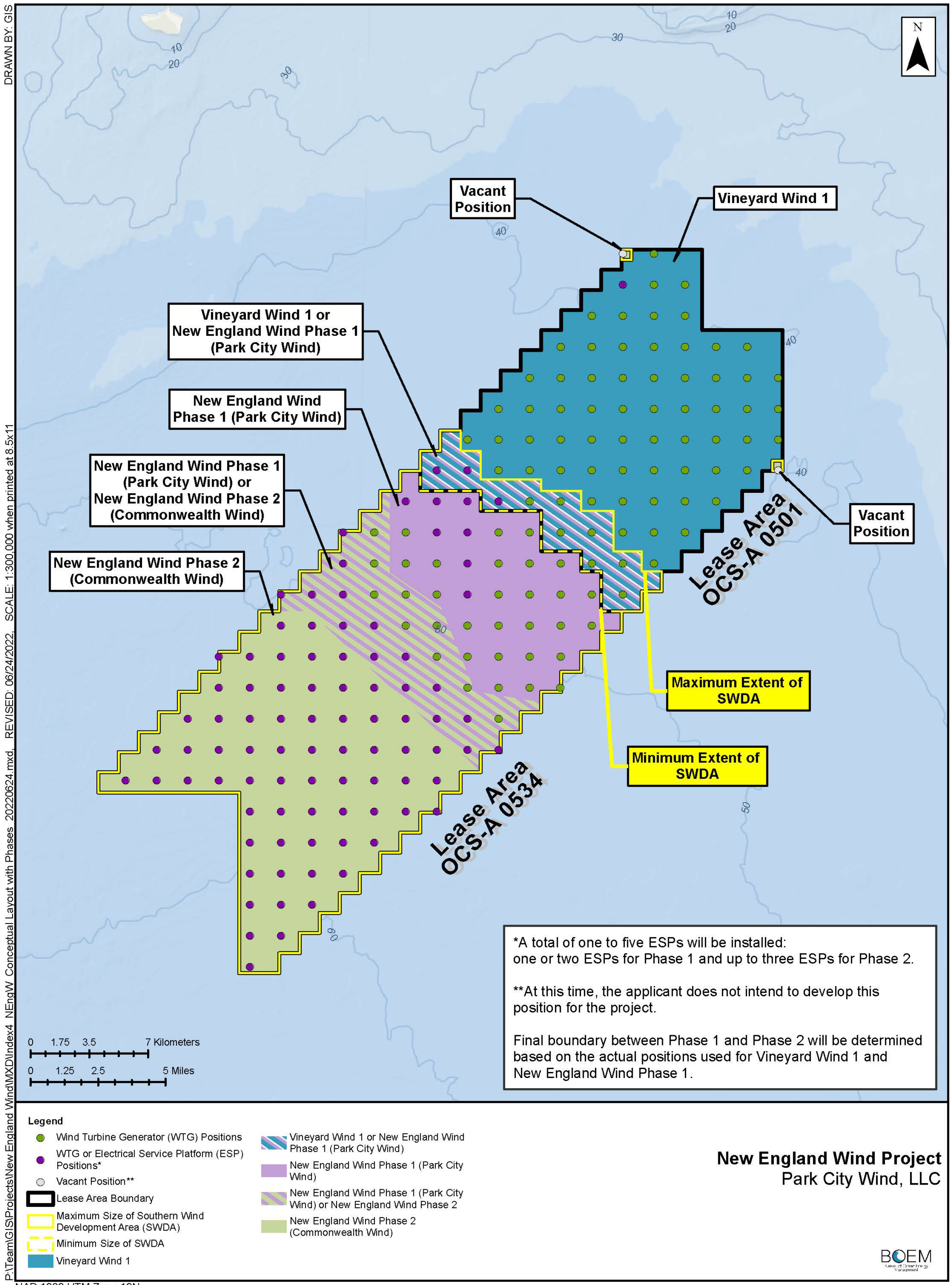


**Figure J-2: Proposed Project Overview**

BOEM has determined that construction, operations, and decommissioning constitute an undertaking subject to Section 106 of the NHPA (U.S. Code, Title 54 Section 306108 [54 USC § 306108]) and its implementing regulations (36 CFR Part 800), and that the activities proposed under the COP have the potential to affect historic properties.

### J.1.1 Background

In 2014, BOEM prepared an environmental assessment to analyze the environmental impacts associated with issuing commercial wind leases and approving site assessment activities within the Massachusetts wind energy area (BOEM 2014). Additionally, in May 2012, BOEM executed the Massachusetts and Rhode Island Programmatic Agreement (BOEM 2012a) and concurrently conducted a NHPA Section 106 review of its decision to issue commercial leases within the Massachusetts wind energy area (BOEM 2012b). On April 1, 2015, BOEM held a competitive leasing process as prescribed in 30 CFR § 585.211 and awarded Lease Area OCS-A 0501 to Vineyard Wind 1, LLC. Subsequently, Vineyard Wind submitted a Site Assessment Plan for the installation of meteorological buoys, which BOEM reviewed under NHPA Section 106, resulting in its October 6, 2017, *Finding of No Historic Properties Affected* (BOEM 2017a).

On June 28, 2021, BOEM assigned 65,296 acres of Lease Area OCS-A 0501 to Vineyard Wind 1, LLC. The remaining 101,590 acres, which were designated Lease Area OCS-A 0534 and where most of the proposed Project would be developed, were assigned to the applicant (Figure J-1).[2] A small portion of Lease Area OCS-A 0501 not used for development of Vineyard Wind 1 Project may also be developed as part of the proposed Project. The applicant has the exclusive right to submit a COP for activities within Lease Area OCS-A 0534.[3] On September 21, 2021, a restructuring of the project's parent company resulted in Avangrid Renewables taking full ownership of Lease Are OCS-A 0534. In October 2021, the project name changed from Vineyard Wind South to New England Wind to reflect the restructuring of the proposed Project's parent company.

### J.1.2 Undertaking

The applicant proposes to construct, operate, and eventually decommission the proposed Project, which would consist of up to 130 WTG and up to 5 ESP positions and would be developed in two phases. Phase 1, also known as the Park City Wind Project, would deliver approximately 804 MW through the installation of 41 to 62 WTGs and one to two ESPs immediately southwest of the Vineyard Wind 1 Project, which is currently under construction. Phase 2, also known as the Commonwealth Wind Project, would deliver at least 1,232 MW through the installation of an additional 64 to 88 WTG/ESP positions, immediately southwest of Phase 1. The applicant would install up to five offshore export cables (two for Phase 1 and two to three for Phase 2) in an offshore export cable corridor (OECC) that would transmit the electricity generated by the WTGs to landing sites (one for each phase) in the Town of Barnstable, Massachusetts, and then to onshore export cable routes (OECR) (one for each phase) and one or more substation sites in the Town of Barnstable for interconnection with the regional electrical grid (Figures J-3 and J-4). Other proposed Project components would include onshore operations facilities within existing developed ports in the region.

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[2] Except for the description of lease area, which now reflects the two different lease areas, the terms, conditions, and stipulations of the two leases, including the lease effective date of April 1, 2015, remain the same.

[3] Lessees may request to assign a portion of their lease to another qualified legal entity.

If technical, logistical, or other unforeseen issues prevent all Phase 2 export cables from being installed in the proposed OECC, the applicant would develop and use the Western Muskeget Variant (Figure J-3) for one or more cables.

If technical, logistical, grid interconnection, or other unforeseen issues prevent all Phase 2 export cables from interconnecting at a substation site in the Town of Barnstable, the applicant would develop and use the South Coast Variant (SCV) in place of or in addition to the currently proposed Phase 2 OECC and OECR. The SCV OECC would extend from the SWDA to a landing site and OECR in Bristol County, Massachusetts (Figure J-3). The applicant has provided information on the portion of the SCV OECC outside of the 3-nautical-mile (3.4-mile) limit of territorial waters (i.e., "federal waters"). The applicant has not provided information on grid interconnection routes, onshore cable routes, landfall locations, and nearshore cable routes in Bristol County. Therefore, this Finding of Adverse Effect only evaluates the portion of the SCV in federal waters. If the applicant determines that the SCV is necessary, phased identification and evaluation of historic properties for the remainder of the SCV would be completed at that time, pursuant to 36 CFR § 800.4(b)(2). BOEM would conduct Section 106 consultation for the remainder of the SCV with the Massachusetts State Historic Preservation Officer (SHPO), Advisory Council on Historic Preservation (ACHP), federally recognized Tribal Nations, and other identified consulting parties, and the effects of the SCV to historic properties would be evaluated in a separate Finding and supplemental NEPA analysis.

If the SCV is used and information pertaining to identification of historic properties would not be available until after the Record of Decision is issued, BOEM will use the MOA (Attachment J-1) to establish commitments for phased identification and evaluation of historic properties within the area of potential effects (APE) in accordance with BOEM's existing *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* and ensure potential historic properties are identified, effects assessed, and adverse effects resolved prior to construction.

### J.1.3 Area of Potential Effects

The APE for this undertaking is defined by the Section 106 implementing regulations (36 CFR § 800.16[d]).

> The geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

BOEM (2020a) defines the undertaking's APE as the following:

- The depth and breadth of the seabed potentially affected by any bottom-disturbing activities, constituting the marine archaeological resources portion of the APE;
- The depth and breadth of terrestrial areas potentially affected by any ground-disturbing activities, constituting the terrestrial archaeological portion of the APE;
- The viewshed from which renewable energy structures, whether offshore or onshore, would be visible, constituting the viewshed portion of the APE; and
- Any temporary or permanent construction or staging areas, both onshore and offshore.

The SWDA, OECC, and terrestrial facilities make up the footprint of the proposed Project. The terrestrial archaeological resources portion of the APE (terrestrial APE), the marine archaeological resources portion of the APE (marine APE), and the APE for visual effects analysis (visual APE) are defined based on these proposed Project component footprints.

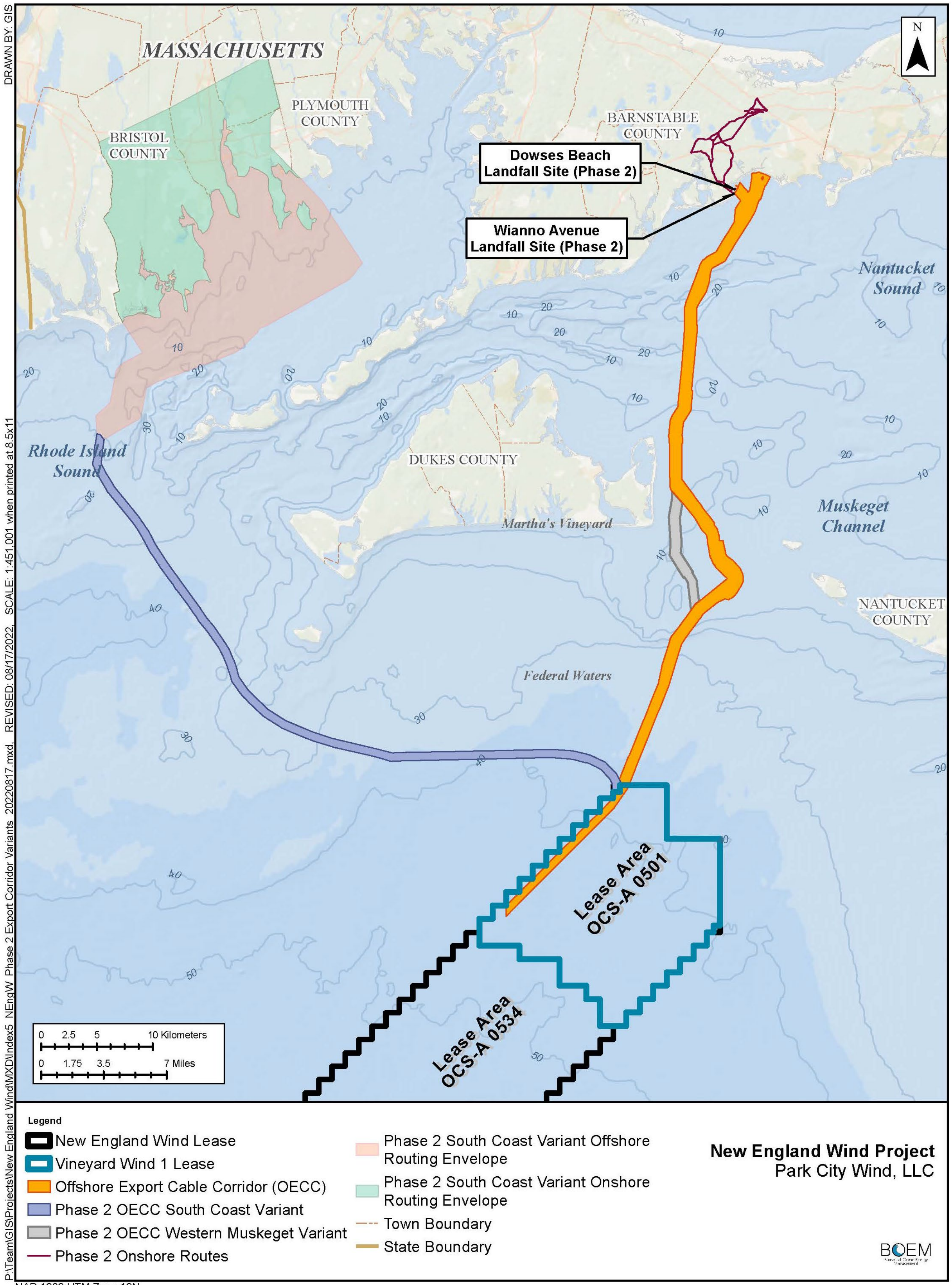



**Figure J-3: Proposed Phase 2 Variants**

### J.1.3.1 Marine Area of Potential Effects

The marine APE includes the footprint for activities within the SWDA and OECC (Figure J-4). This includes areas affected by vessel anchors, the work zones around WTG and ESP positions, scour protection, inter-array cables, inter-link cables, offshore export cables, the portion of the SCV OECC in federal waters, and the Western Muskeget Variant of the OECC. Phase 1 would occupy 37,066 to 57,081 acres of the SWDA, while Phase 2 would occupy the remaining 54,857 to 74,873 acres, depending on the number of WTG and ESP positions used for each phase. Water depths in the SWDA range from 141 to 203 feet, and effects on the seafloor resulting from lift boat/jack-up vessels would be contained to the work zone around the WTGs and ESP(s) positions and OECC. The vertical APE is based on the maximum proposed disturbance depth defined within the proposed Project design envelope and varies by component, while the horizontal depth reflects the impacted area. Table J-1 summarizes the vertical and horizontal APE from each proposed Project offshore component.

**Table J-1: Vertical and Horizontal Extent of the Marine Area of Potential Effects for the Proposed Project**

| Facility | APE | Extent (feet) |
|---|---|---|
| Cables | Vertical (below seafloor surface) | 10 |
| (Inter-array, inter-link, and OECC) | Horizontal | Entire SWDA and OECC |
| WTGs | Vertical | 279 |
| | Horizontal[a] | 591 |
| ESPs | Vertical | 279 |
| | Horizontal[a] | 591 |

APE = area of potential effects; ESP = electrical service platform; OECC = offshore export cable corridor; SWDA = Southern Wind Development Area; WTG = wind turbine generator
[a] This is the maximum radius work zone around each WTG and ESP foundation where construction would occur.

The vertical APE for the cables is 10 feet below the seafloor surface, which is the maximum penetration depth of the anchors that may be used by vessels during cable installation. The target burial depth of the cables is 5 to 8 feet. The horizontal APE for the OECC is defined as the entire length and width of the OECC, which would extend up to 62.7 miles from the northernmost ESP in the SWDA to landfall sites in Barnstable County, with an average width of approximately 3,609 feet. If the applicant chooses to construct the SCV, the associated OECC would extend up to approximately 60 miles from the SWDA to a landfall site in Bristol County, including approximately 40 miles in federal waters. Because the applicant has only identified the federal waters portion of the SCV OECC (that portion beyond the 3-nautical-mile [3.5-mile] limit of the shore), the marine APE evaluated in this document only includes that area.

### J.1.3.2 Terrestrial Area of Potential Effects

The terrestrial APE includes areas of potential ground disturbance associated with the onshore construction and operations of the proposed undertaking. The terrestrial APE is presented as part of the proposed Project design envelope, which includes the proposed substation sites, areas in and around the proposed landfall sites, as well as the OECR in the Town of Barnstable. Figure J-5 through J-8 show the terrestrial APE for both phases.

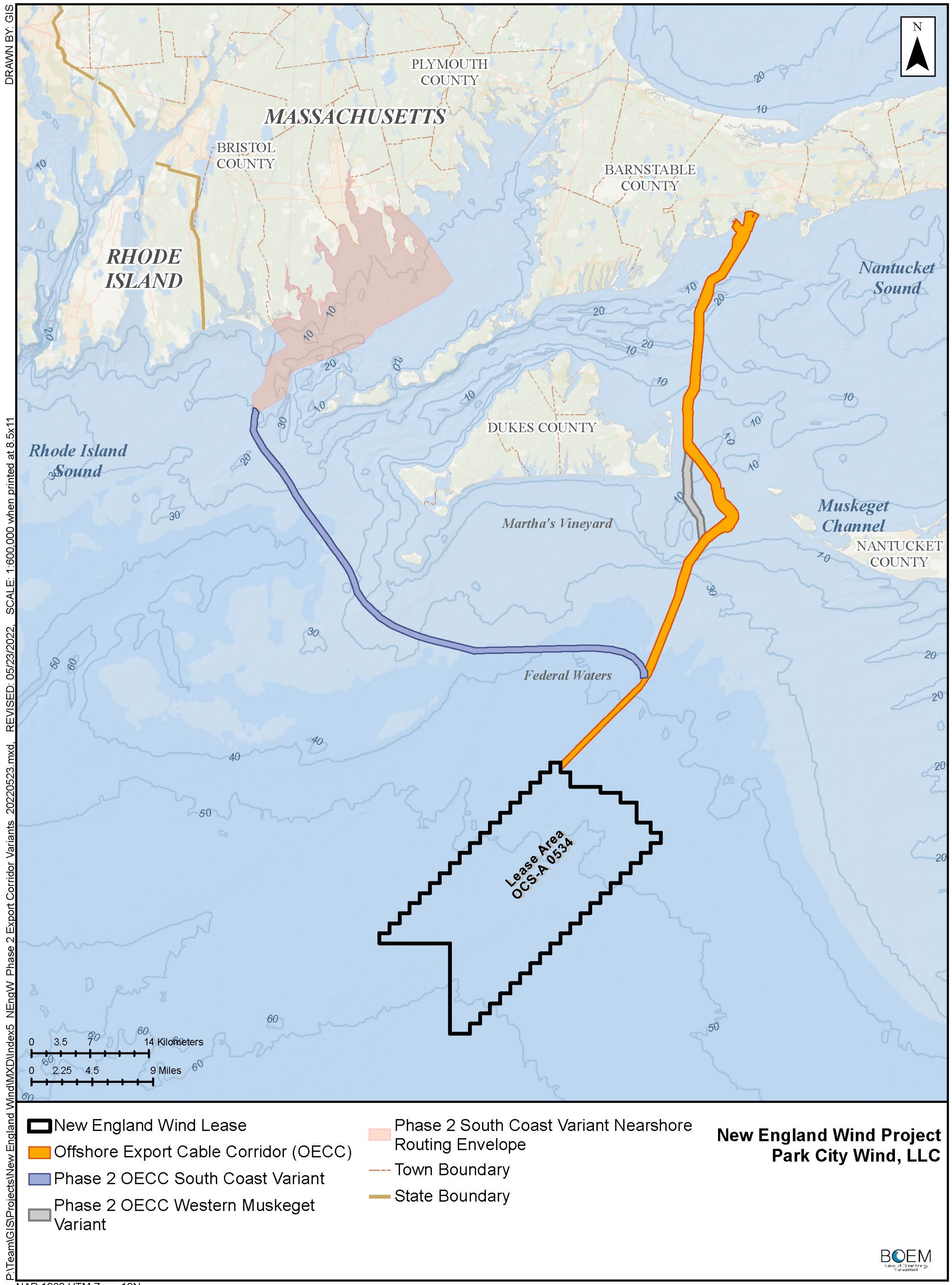
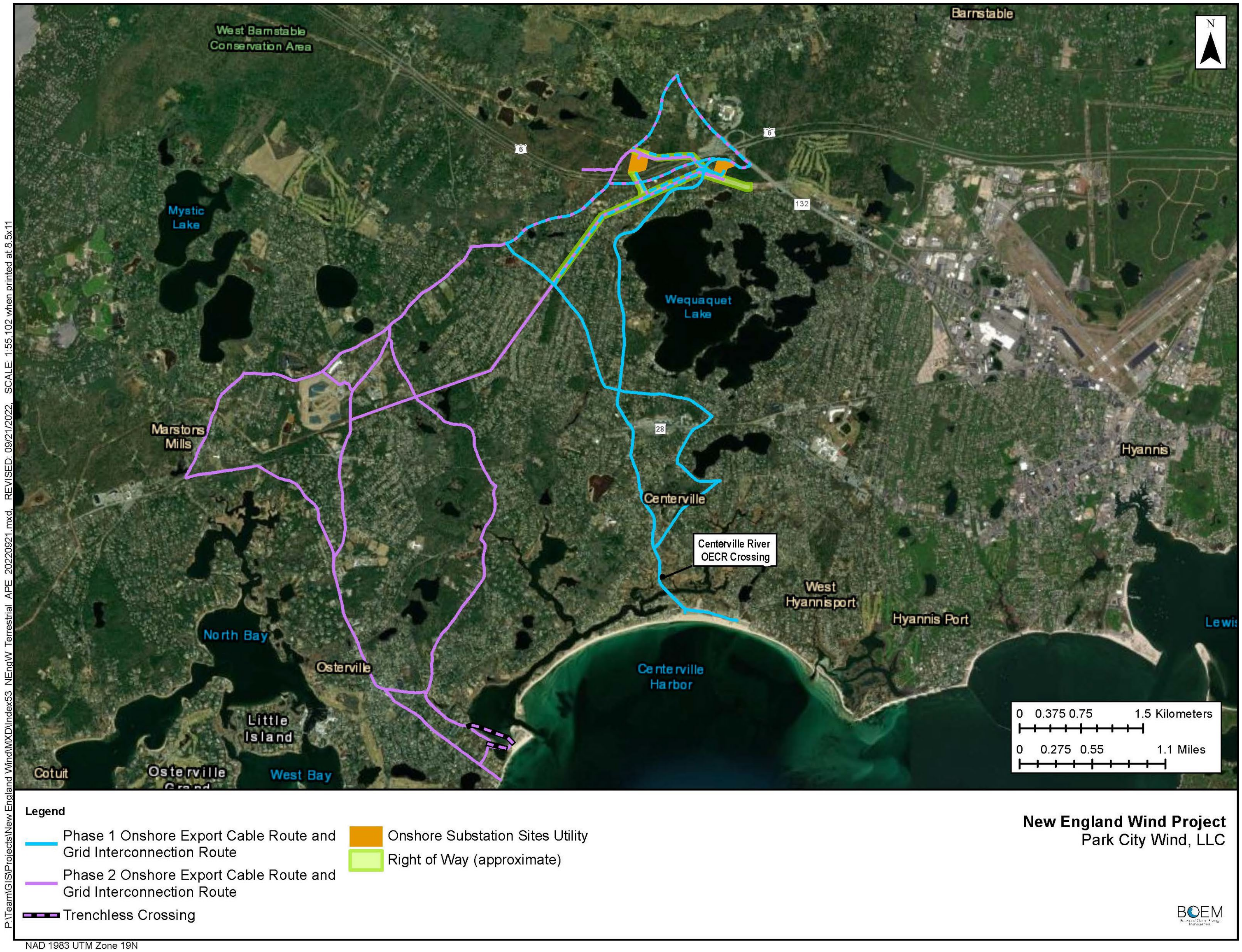


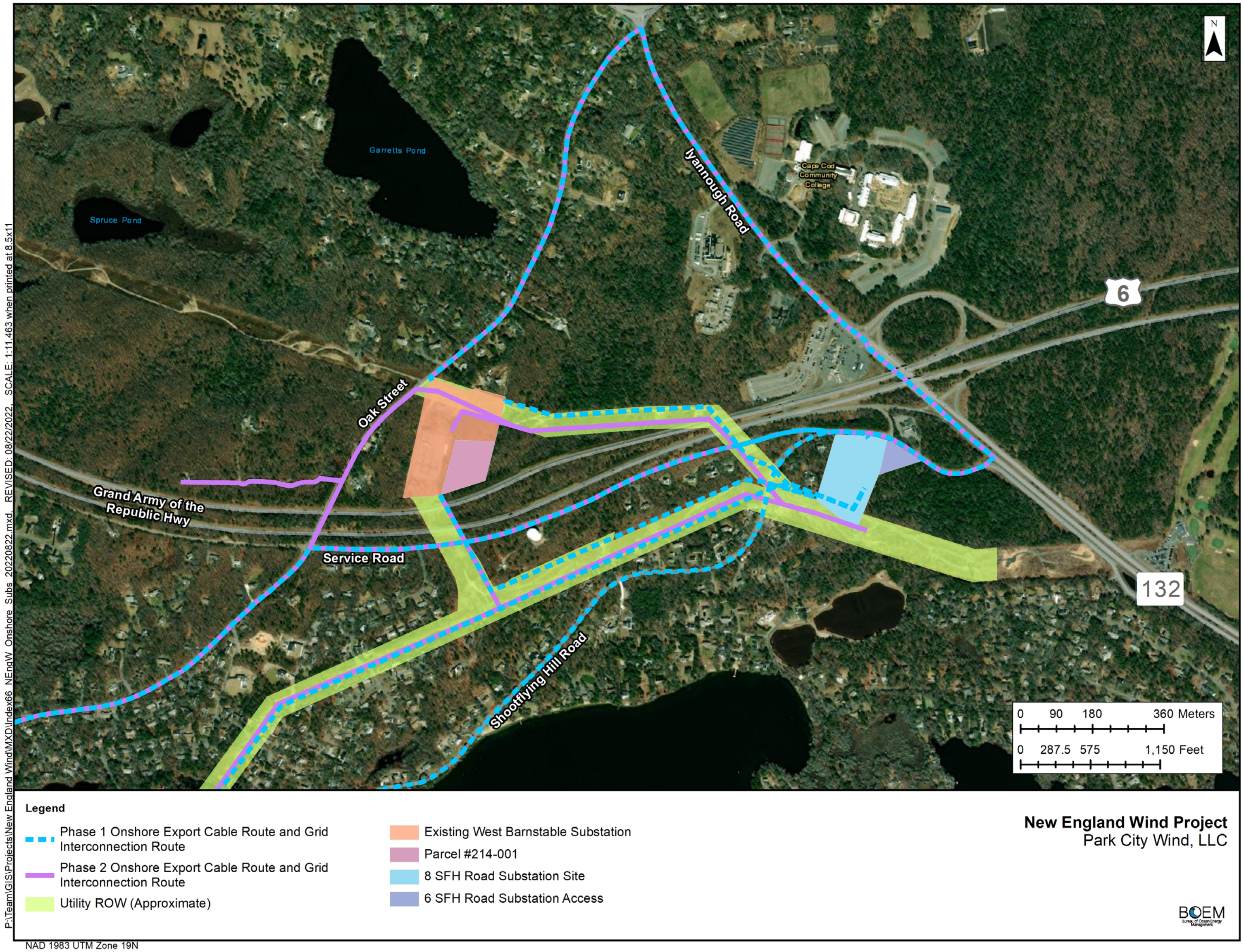

**Figure J-4: Marine Area of Potential Effects**




OECR = onshore export cable route

**Figure J-5: Terrestrial Area of Potential Effects**


**Figure J-6: Terrestrial Area of Potential Effects, Phase 1 Landfall Sites**




ROW = right-of-way; SFH = Shootflying Hill

**Figure J-7: Terrestrial Area of Potential Effects, West Barnstable Substation Area**

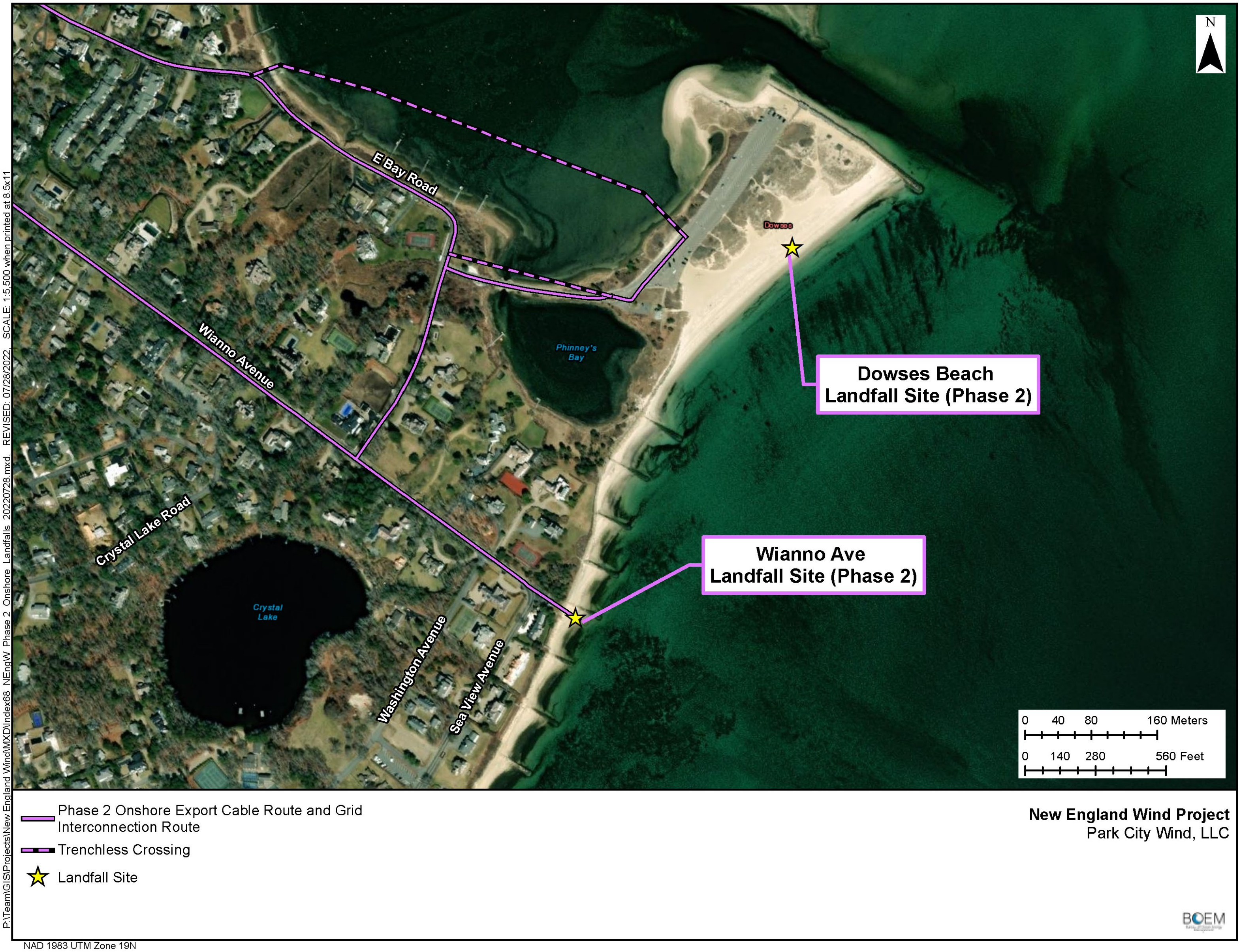



**Figure J-8: Terrestrial Area of Potential Effects, Phase 2 Landfall Sites**

### Phase 1

The potential Phase 1 landfall sites at Covell's Beach or Craigville Beach, OECR and grid interconnection route options, 6 and 8 Shootflying Hill Road, the existing West Barnstable Substation, Parcel #214-001, and any temporary or permanent construction or staging areas, both onshore and offshore, comprise the APE for Phase 1's direct physical effects (Figures J-5 through J-7). During Phase 1, ground-disturbing activities would occur at the selected landfall site, along the OECR (including the Centerville River crossing and associated construction, staging, and laydown areas) and grid interconnection route, and at the onshore substation sites and associated parcels. The cable landfall would be accomplished with trenchless methods. The Phase 1 OECR would follow one of two potential routes depending on which landing site is chosen. These routes would extend approximately 4 to 6.5 miles in a northward direction to the Phase 1 onshore substation site near the existing West Barnstable Substation. The OECR would be installed underground primarily through trenching within or adjacent to existing roads and utility right-of-way (ROW). The OECR would include manhole covers at the landfall sites and along the selected route.

The Phase 1 onshore substation would be constructed at 8 Shootflying Hill Road on a privately owned 6.7-acre parcel of land. It would result in ground-disturbing activities associated with the removal of the existing Knights Inn Motel and its associated parking lot, and construction of the substation. The applicant has also secured an option to purchase a 1-acre parcel at 6 Shootflying Hill Road, immediately northeast of the proposed substation site, which would be used for an improved access road to the onshore substation site.

The Phase 1 OECR would cross the Centerville River. The applicant's preferred crossing methods are trenchless (microtunnel, horizontal directional drilling, and direct pipe), and would not disturb the surface or river bottom (COP Volume I, Section 3.3.1.10; Epsilon 2022). If these methods prove infeasible, the applicant would construct a utility bridge northeast (upstream) of the existing Craigville Beach Road bridge. The utility bridge would be an aboveground, independent structure parallel to and approximately 3 feet from the existing road bridge.

The applicant has secured an approximately 2.8-acre parcel, identified as assessor map parcel #214-001, immediately southeast of the West Barnstable Substation. This parcel could be used as the northern terminus of a trenchless OECR crossing of State Route 6, as well as the location of some substation structures currently intended for the 8 Shootflying Hill Road site.

### Phase 2

During Phase 2, ground-disturbing activities would occur at the selected landfall site at either Dowses Beach or Wianno Avenue (Figure J-8), along the OECR and grid interconnection route (Figure J-5), and at the onshore substation sites and associated parcels (i.e., the same sites and parcels described for Phase 1; Figure J-7). Both Phase 2 landfall sites in the Town of Barnstable, all potential Phase 2 OECR and grid interconnection route options, and any temporary or permanent construction or staging areas, both onshore and offshore, are included in the APE (Figure J-6).

The potential Phase 2 landfall sites at Dowses Beach or Wianno Avenue, OECR and grid interconnection route options, 6 and 8 Shootflying Hill Road, the existing West Barnstable Substation, and Parcel #214-001 comprise the APE for Phase 2's direct physical effects.

### J.1.3.3 Visual Area of Potential Effects

Using BOEM's (2020a) definitions, the visual area of effects is the viewshed from which renewable energy structures, whether offshore or onshore, would be visible (Figure J-9). As such, the APE will include areas from which the proposed undertaking would, with some certainty, be visible and recognizable under a reasonable range of meteorological conditions.

**Offshore Visual Area of Potential Effects**

The WTGs would be the tallest and most visible component of the proposed undertaking, with a nacelle-top height of 725 feet above mean lower low water and a maximum vertical blade-tip extension of 1,171 feet mean lower low water for both phases. As a result, the visual APE for the WTGs encompasses that of the ESPs, which would be substantially shorter. With this height, curvature of the earth, and during optimal viewing conditions (i.e., an absence of haze, fog, sea spray, etc.), the maximum theoretical distance from which the top of the nacelles (where required Federal Aviation Administration hazard lighting would be placed) could potentially be visible is 37.5 miles.

Taking into consideration this range of visibility, the applicant identified a zone of visual influence (ZVI). The ZVI includes land areas within the 37.5-mile maximum theoretical area of nacelle visibility where proposed WTGs could most likely be visible, based on topography, vegetation, and existing structures. While blade tips extending above nacelle top could theoretically be visible from larger distances, the ZVI represents ideal viewing conditions where the proposed WTGs would most likely be perceptible by viewers in reality. The applicant identified portions of the ZVI where both the nacelle and blades could be visible and where only the blades (i.e., the portion of the blades that extend above the nacelle) would be visible using geographic information system viewshed analyses that incorporated light detection and ranging data. EIS Section 3.17, Scenic and Visual Resources, and EIS Appendix I, Seascape and Landscape Visual Impact Assessment, used 40 nautical miles (46 miles) as the limit for seaward views.

Studies of onshore and offshore visibility (Sullivan et al. 2012, 2013) suggest that the extinction point for views of WTGs and other structures is much less than 40 nautical miles (46 miles); therefore, 40 nautical miles is used here as an intentionally conservative outer limit for visibility.

Mainland landfall sites, export cables within the OECC, and inter-array and inter-link cables within the SWDA would all be below the surface of the ocean or land, and thus would not generate visual effects beyond the temporary presence of construction vessels.

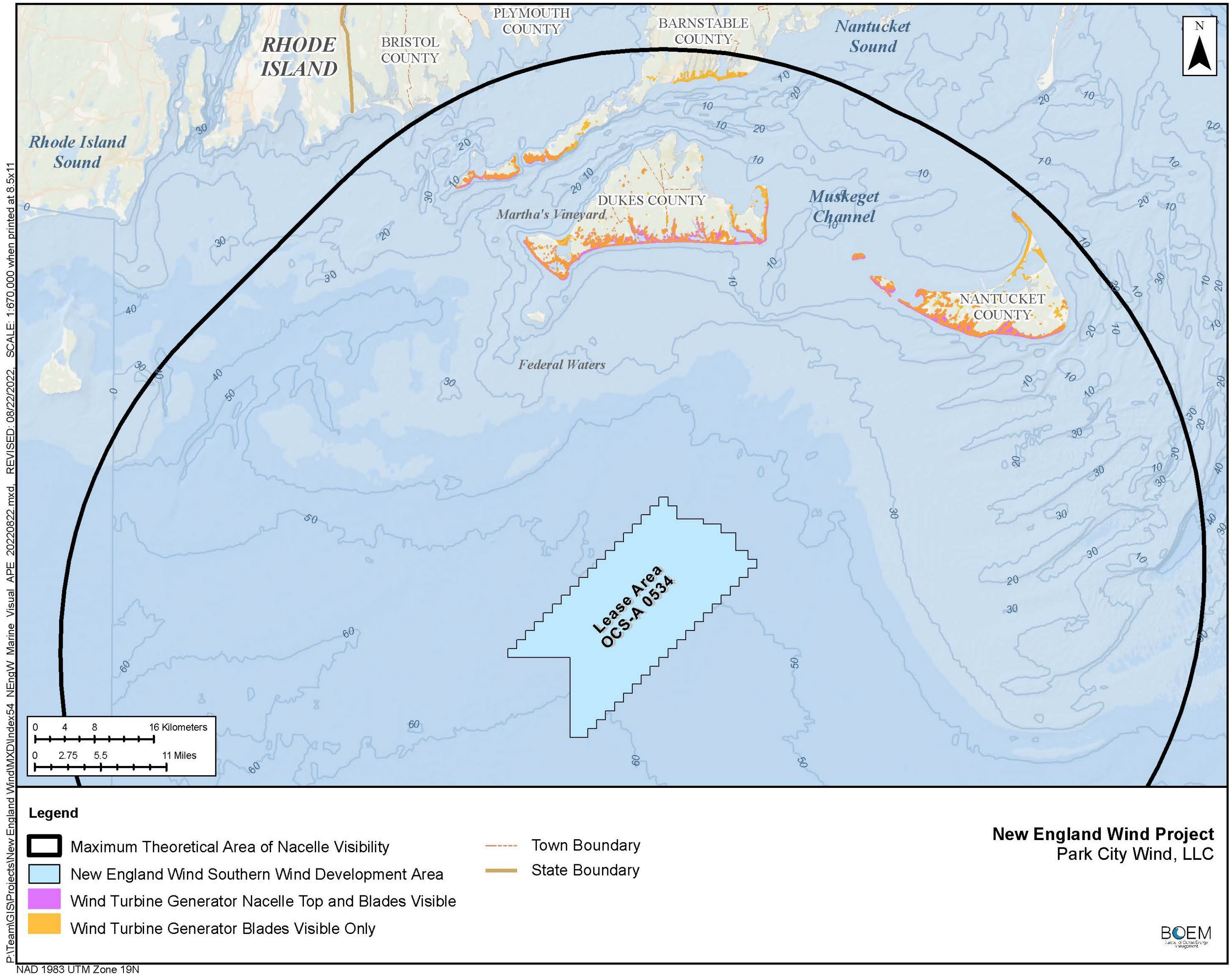



**Figure J-9: Offshore Visual Area of Potential Effects**

**Onshore Area of Potential Effects for Direct Visual Effects**

The proposed undertaking onshore facilities would generate direct visual effects near the onshore substation sites and parcels and at the Centerville River crossing, if an aboveground crossing technique is used for the Phase 1 OECR (Figures J-10 and J-11). A 0.25-mile buffer surrounding these sites encompasses the potential visual effects from the proposed undertaking construction and operations. After construction, the applicant would plant vegetative screening on the western and northern boundaries of the 8 Shootflying Hill Road onshore substation site to limit visibility from existing residences. The eastern boundary would be developed into a perimeter access drive, and the abutting land is undeveloped wooded land. The entire site would have a perimeter access fence, and the western edge could have attenuation walls, if necessary.

In addition to the bridge structure itself, the Centerville River utility bridge would include a 9-foot anti-climb fence that would constitute the most visible element of the proposed bridge structure. Overall, the placement of the bridge adjacent to the existing bridge; as well as existing topography, vegetation, and the winding course of the river, would largely obscure it from view. A 100-foot buffer surrounding the existing Centerville River bridge has been defined as the visual APE for this portion of the proposed undertaking's footprint.

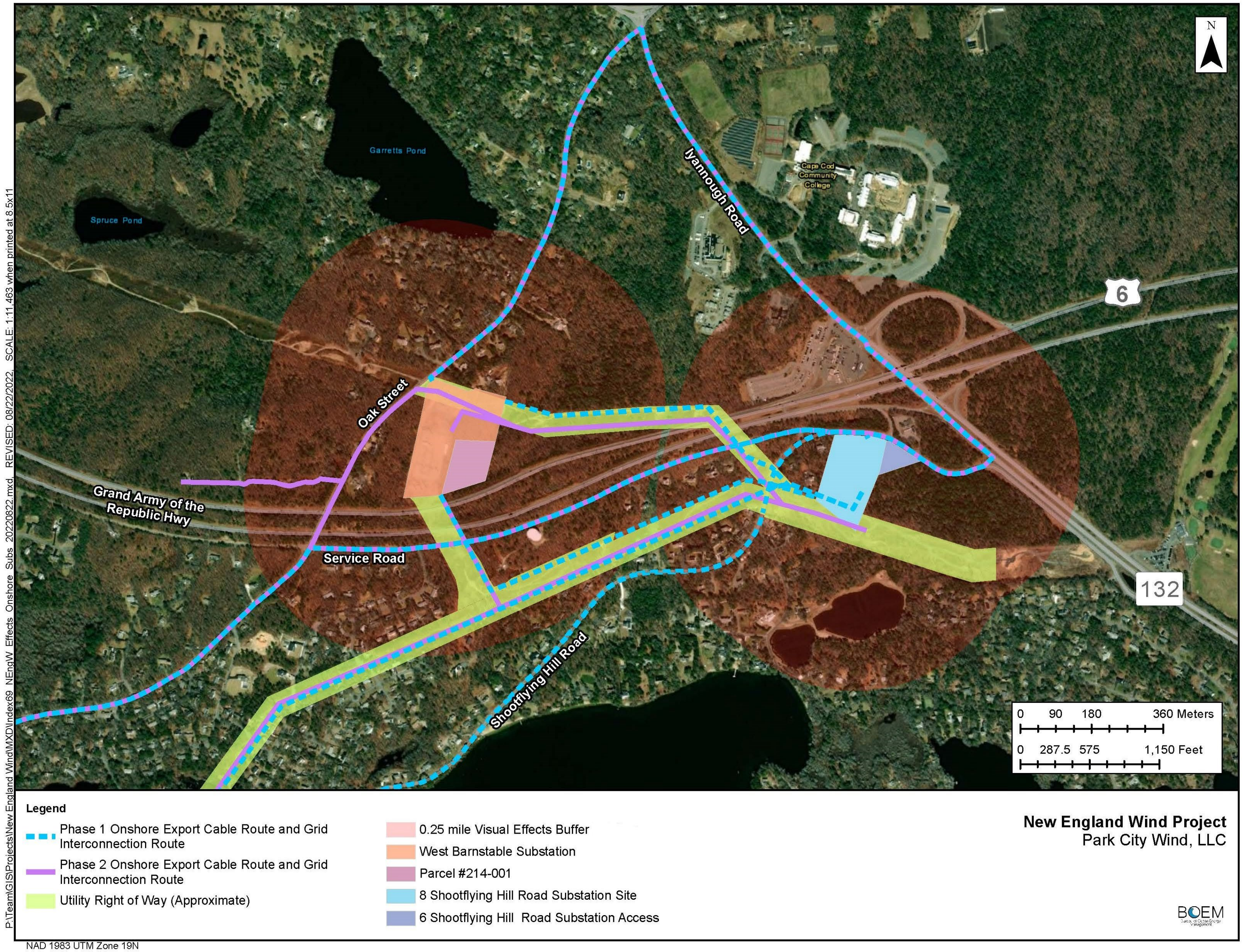



**Figure J-10: Onshore Visual Area of Potential Effects, Barnstable Substation Sites**


**Figure J-11: Onshore Visual Area of Potential Effects, Centerville River Bridge**

# J.2 Steps Taken to Identify Historic Properties

## J.2.1 Technical Reports

The applicant has conducted onshore and offshore cultural resource investigations (Table J-2) to identify known and previously undiscovered cultural resources within the marine, terrestrial, and visual portions of the APE. BOEM has reviewed all of the reports summarized in Table J-2 and found them to be sufficient. Collectively, BOEM finds that these reports represent a good-faith effort to identify historic properties within the proposed undertaking's APE. All of the documents summarized in Table J-2 will be shared with consulting parties and are hereby incorporated by reference.

**Table J-2: Summary of Cultural Resources Investigations and Cultural Resources for the Proposed Project**

| Project Area/APE | Studies[a] | Summary of Findings |
|---|---|---|
| Offshore | Marine Archaeological Assessment Report for the New England Wind Offshore Wind Farm for OCS-A 0534 Construction and Operations Plan (COP Volume II-D; Epsilon 2022) | • The applicant's cultural resources consultant conducted a marine archaeological resources assessment of high-resolution geophysical survey data collected by multiple non-intrusive survey campaigns by third party marine survey contractors within the SWDA.<br>• Three potential shipwrecks were identified within the SWDA, which are recommended for avoidance.<br>• Sixteen ancient submerged landform features were identified within the SWDA. Avoidance is recommended to the extent feasible. |
| Offshore | Marine Archaeological Assessment Report for the OECC (COP Volume II-D, Appendix A; Epsilon 2022) | • The applicant's cultural resources consultant conducted a marine archaeological resources assessment for the proposed OECC, as well as support for high-resolution geophysical surveys and geotechnical activities for the OECC.<br>• Survey activities were conducted over five seasons from 2016 to 2020 (extending to February 2021).<br>• One potential shipwreck was identified within the SWDA, which is recommended for avoidance.<br>• Sixteen ancient submerged landform features, identified as Channel Groups 8-18, 21-22, 29, and 30, are considered to belong to the Nantucket Sound TCP. Avoidance is recommended to the extent feasible. |
| Offshore | Marine Archaeological Assessment Report in Support of the South Coast Variant Offshore Export Cable Corridor Construction and Operations Plan (COP Volume II-D, Appendix E; Epsilon 2022) | • The applicant's cultural resources consultant conducted a marine archaeological resources assessment of the proposed SCV of the OECC, as well as to provide archaeological support for high-resolution geophysical marine surveys and subsequent geotechnical activities for the OECC.<br>• Two potential shipwrecks were identified within the SCV OECC, which are recommended for avoidance.<br>• Seventeen ancient submerged landform features were identified within the SCV OECC. Avoidance is recommended to the extent feasible. |
| Onshore | Terrestrial Archaeology Reports:<br>Phase 1 Report: Archaeological Reconnaissance Survey, Vineyard Wind 501 South Phase 1 Onshore Development Area, Potential Export Cable Routes and | • The Phase 1 Reconnaissance Report survey was conducted for the potential export cable routes and proposed substation project in the Town of Barnstable.<br>• The study area consisted of the preliminary APE and a 0.5-mile buffer.<br>• Archival research identified 16 archaeological sites, including 8t pre-Contact sites, s7 post-Contact sites, and 1 site multicomponent within and/or adjacent to the study area.<br>• Zones of high archaeological sensitivity were identified in the proposed landfall sites at Covell's and Craigville beaches and the southern end of the OECR in Barnstable.<br>• Small zones of high sensitivity for pre-Contact sites are at the southern end of Long Pond and north shore of Wequaquet Lake. |

| Project Area/APE | Studies[a] | Summary of Findings |
|---|---|---|
| | Proposed Substation (June 1, 2020) (COP Appendix III-G; Epsilon 2022) | • Zones of high and moderate sensitivity within the north portion of the APE are the substation at 8 Shootflying Hill Road, a section of existing utility ROW, and west of Wequaquet Lake.<br>• Zones of high sensitivity for post-Contact archaeological resources exist along the export cabling routes near an NRHP-listed property along Phinneys Lane.<br>• Zones of moderate sensitivity for pre- and post-Contact resources are within the potential export cabling routes along the Eversource ROW; Shootflying Hill; Great Marsh and Old Stage Roads; Main, South Main, and Oak Streets; and Phinneys Lane.<br>• Archaeological monitoring of Project construction activities was recommended within the identified zones of high and moderate archaeological sensitivity along existing roads in the proposed Project area. The consultant also recommended an intensive archaeological survey for the proposed substation at the 8 Shootflying Hill Road and Parcel #214-001. |
| Onshore | Terrestrial Archaeology Report–Phase 1 Report: Intensive Archaeological Survey New England Wind Phase 1 (Park City Wind)/New England Wind 1 Connector Onshore Project Components (COP Appendix III-G; Epsilon 2022) | • The Phase 1 Intensive Archaeological Survey was conducted in the locations of four proposed onshore components in the Town of Barnstable.<br>• The four onshore proposed Project components are 6.7-acre and 1.0- acre parcels for a substation site at 6 and 8 Shootflying Hill Road, a trenchless crossing entry bore and a 1,960-square-foot temporary work zone for an OECR crossing of the Centerville River within a 0.28-acre residential lot at 2 Short Beach Road, a trenchless exit pit and 400-foot-long pipe laydown north of the Centerville River in the shoulder of Craigville Beach Road, and a 2.8-acre parcel (Parcel #214001) for a proposed trenchless crossing under Route 6.<br>• Two pre-Contact find spots and a site were identified and recommended not eligible for NRHP listing.<br>• No additional archaeological investigations are recommended. Archaeological monitoring of other components within areas of moderate or high archaeological sensitivity would be conducted during construction. |
| Onshore | Technical Memorandum, Vineyard Wind 501 South Phase 2 Onshore Export Cable Routing and Substation Envelope, Cultural Resources Archaeological Due Diligence Study, June 1, 2020; Revised March 26, 2021 (COP Appendix III-G; Epsilon 2022) | • Due diligence study of the Phase 2 OECR and substation envelope was conducted. Portions overlap with Phase 1 potential cable routes.<br>• No NRHP-listed archaeological sites are within the study area.<br>• Forty-two pre-Contact and 15 post-Contact sites have been identified within the study area.<br>• The recorded pre-Contact sites can be considered to form four broad groups or clusters within different physiographic settings in the Phase 2 study area: Centerville Harbor, Cotuit/West Bay and North Bay, Santuit River, and the Race Lane and Wequaquet Lake clusters.<br>• The post-Contact sites are within the Cotuit/West Bay and North Bay, Marstons Mills, Race Lane and Prospect Street, Wequaquet Lake, and Garretts Pond (north of Route 6) sections of Barnstable.<br>• Based on the results of the due diligence review and the reconnaissance of the study area, the Phase 2 onshore export cable routing and substation envelope contains areas of moderate to high archaeological sensitivity. |

| Project Area/APE | Studies[a] | Summary of Findings |
|---|---|---|
| Onshore | Archaeological Reconnaissance Survey New England Wind Phase 2 (Commonwealth Wind)/New England Wind 2 Connector (COP Appendix III-G; Epsilon 2022) | • The Phase 1 Reconnaissance Report survey was conducted for the Phase 2 connector and OECRs to identify known pre-Contact, Contact, and post-Contact cultural resources within 0.5-mile study area and the APE.<br>• The proposed Project area for this survey consisted of two alternate cable landfall sites at Dowses Beach and Wianno Avenue and potential OECRs along existing roadways and utility ROWs in Barnstable.<br>• Research identified no NRHP-listed archaeological site. Fifteen recorded pre-Contact and 13 post-Contact archaeological sites were identified within the OECR study area.<br>• Of the research identified sites, four pre-Contact, five post-Contact, and one site with pre-Contact, Contact, and post-Contact components may be located within and/or adjacent to the Phase 2 onshore export cabling route options.<br>• A combined windshield/walkover survey was conducted to further refine zones of archaeological sensitivity initially delineated in a due diligence study for the Phase 2 potential OECRs.<br>• Archaeological monitoring of Project construction areas within the staging areas required for horizontal directional drilling in the landfall area and during installation of OECR and other components within the identified zones of high and moderate archaeological sensitivity are recommended. |
| Onshore | Technical Memorandum, New England Phase 2 Potential Onshore Substation Sites, Cultural Resources Archaeological Due Diligence Study, April 20. 2022 (COP Appendix III-G; Epsilon 2022) | • Due diligence study of the Phase 2 OECR and substation envelope was conducted. Portions overlap with Phase 1 potential cable routes.<br>• No NRHP-listed archaeological sites are within the study area.<br>• Forty-two pre-Contact and 15 post-Contact sites have been identified within the study area.<br>• The recorded pre-Contact sites can be considered to form four broad groups or clusters within different physiographic settings in the Phase 2 study area: Centerville Harbor, Cotuit/West Bay and North Bay, Santuit River, and the Race Lane and Wequaquet Lake clusters.<br>• The post-Contact sites are within the Cotuit/West Bay and North Bay, Marstons Mills, Race Lane and Prospect Street, Wequaquet Lake, and Garretts Pond (north of Route 6) sections of Barnstable.<br>• Based on the results of the due diligence review and the reconnaissance of the study area, the Phase 2 Onshore Export Cable Routing and Substation Envelope contains areas of moderate to high archaeological sensitivity. |
| Visual | New England Wind Visual Impact Assessment (COP Appendix III-H.a; Epsilon 2022) | • The applicant's consultants conducted a visual impact assessment to identify potential visibility of the proposed Project's offshore facilities and determine the difference in landscape quality with and without the proposed Project in place. |
| Visual | New England Wind Historic Properties Visual Impact Assessment (COP Appendix III-H.b; Epsilon 2022) | • The Historic Properties Visual Impact Assessment identified a variety of historic properties that the proposed Project may affect. These include NHLs, properties listed on the NRHP, TCPs, properties on the Massachusetts State Register of Historic Places, and properties on the Inventory of Historic and Archaeological Assets of the Commonwealth.<br>• It was determined that the proposed Project would have a visual impact on the Gay Head Lighthouse and the Vineyard Sound and Moshup's Bridge TCP. Additionally, BOEM determined the proposed Project would have a visual impact on the Nantucket Historic District NHL, the Nantucket Sound TCP, the Chappaquiddick Island TCP, the Gay Head–Aquinnah Shops Area, and the Edwin Vanderhoop Homestead (Aquinnah Cultural Center). |

APE = area of potential effects; BOEM = Bureau of Ocean Energy Management; COP = Construction and Operations Plan; NHL = National Historic Landmark; NRHP = National Register of Historic Places; OECC = offshore export cable corridor; OECR = onshore export cable route; ROW = right-of-way; SWDA = Southern Wind Development Area; TCP = traditional cultural property

[a] Not all reports are publicly available due to sensitive information.

### J.2.2 Consultation and Coordination with the Parties and Public

#### J.2.2.1 Early Coordination

Since 2009, BOEM has coordinated OCS renewable energy activities offshore Massachusetts with its federal, state, local, and tribal government partners through its Intergovernmental Renewable Energy Task Force. Additionally, BOEM has met regularly with federally recognized tribes that may be affected by renewable energy activities in the area since 2011, specifically during planning for the issuance of leases and review of site assessment activities. BOEM also hosts public information meetings to help keep interested stakeholders updated on major renewable energy milestones. Information pertaining to BOEM's Massachusetts Intergovernmental Renewable Energy Task Force meetings is available at https://www.boem.gov/Massachusetts-Renewable-Energy-Task-Force-Meetings/, and information pertaining to BOEM's overall stakeholder engagement efforts (separate from stakeholder engagement associated with individual offshore wind projects) is available at https://www.boem.gov/renewable-energy/state-activities/public-information-meetings.

#### J.2.2.2 National Environmental Policy Act Scoping and Public Hearings

**Public Scoping–First Round**

On June 30, 2021, BOEM issued a Notice of Intent (NOI) to prepare an EIS consistent with NEPA regulations (42 USC § 4321 et seq.) to assess the potential impacts of the Proposed Action and alternatives (86 *Federal Register* 34782 [June 30, 2021]). The NOI commenced a public scoping process for identifying issues and potential alternatives for consideration in the EIS. During the formal scoping period, from June 30 through July 30, 2021, three virtual public scoping meetings were held on the dates as outlined in Table J-3.

**Table J-3: Public Scoping Meetings**

| Date | Time |
|---|---|
| July 19, 2021 | Presentation, public statements, and Q&A at 5:30 p.m. eastern daylight time |
| July 23, 2021 | Presentation, public statements, and Q&A at 1:30 p.m. eastern daylight time |
| July 26, 2021 | Presentation, public statements, and Q&A at 5:30 p.m. eastern daylight time |

Q&A = questions and answers

During the formal scoping period, federal agencies, state and local governments, and the general public had the opportunity to submit written and oral comments that would help BOEM identify potential 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 analyze in the EIS, as well as to provide additional information. BOEM also indicated its intent to use the NEPA process to fulfill its review obligations under Section 106 of the NHPA (54 USC § 300101 et seq.), in lieu of the procedures set forth in 36 CFR §§ 800.3 through 800.6 for the proposed undertaking, as permitted by 36 CFR § 800.8(c), which requires federal agencies to assess the effects of projects on historic properties. Additionally, BOEM informed its Section 106 consultation by seeking public comment and input through the NOI regarding the identification of historic properties or potential effects on historic properties from activities associated with approval of the COP.

**Public Scoping–Second Round**

On August 19, 2021, the applicant (then operating as Vineyard Wind, LLC) notified BOEM of the potential need to establish an OECC for Phase 2 of the proposed Project, beyond those previously identified in the COP. The applicant also notified BOEM of the proposed Project's name change (Section J.1.1). On November 22, 2021, BOEM issued a Notice of Additional Public Scoping and Name

Change to announce the project name change, and to assess the potential impacts of the Phase 2 OECC alternative routes (86 *Federal Register* 66334 [November 22, 2021]). This notice commenced a second public scoping process, from November 22 through December 22, 2021, that was similar in intent and purpose to the first scoping process, focusing on the newly proposed Phase 2 OECC alternative routes. Information, including a video presentation was posted to BOEM's website at https://www.boem.gov/renewable-energy/state-activities/new-england-wind-formerly-vineyard-wind-south to provide supporting information on the Phase 2 OECC alternatives.

Through the NEPA scoping process, BOEM received a total of 17 comments regarding cultural, historical, and archaeological, or tribal resources during the public scoping periods. These are presented in BOEM's Scoping Summary Report for the proposed undertaking (BOEM 2022a), available at https://www.boem.gov/renewable-energy/state-activities/new-england-wind-virtual-meeting-room.

### J.2.2.3 National Historic Preservation Act Section 106 Consultations

After receipt of the COP submission from the applicant, BOEM contacted 63 governments and organizations, providing information on the proposed undertaking and inviting each of them to be a consulting party to the NHPA Section 106 review of the COP (Attachment J-2). Entities that responded positively to BOEM's invitation or were subsequently made known to BOEM and added as consulting parties are listed in Attachment J -2. BOEM initiated NHPA Section 106 consultation with letters to these entities on June 14, 2021. BOEM used this correspondence to also notify these parties of the intention to use the NEPA substitution process for Section 106 consultation purposes, as described in 36 CFR § 800.8(c), and provided its *National Environmental Policy Act (NEPA) Substitution for Section 106 Consulting Party Guide* (BOEM 2021a). Additional notifications were sent on November 22, 2021, to describe the proposed Project design changes and project name change, following the additional scoping period. Additionally, parties were again invited to participate after BOEM held an initial NHPA Section 106 consultation meeting virtually on March 3, 2022.

BOEM has held the following government-to-government consultation meetings as of the time of publication of this Finding:

- August 13, 2021: with the Delaware Nation, the Delaware Tribe of Indians, the Mashantucket (Western) Pequot Tribal Nation, the Mashpee Wampanoag Tribe of Massachusetts, and the Wampanoag Tribe of Gay Head (Aquinnah);
- November 4, 2021: with the Delaware Nation, the Mashantucket (Western) Pequot Tribal Nation, the Mashpee Wampanoag Tribe of Massachusetts, and the Wampanoag Tribe of Gay Head (Aquinnah);
- May 2, 2022, and June 2, 2022: with the Wampanoag Tribe of Gay Head (Aquinnah);
- May 26, 2022: with the Mashantucket (Western) Pequot Tribal Nation, the Mashpee Wampanoag Tribe of Massachusetts, and the Wampanoag Tribe of Gay Head (Aquinnah); and
- June 2, 2022: the BOEM Director met in-person with the Mashpee Wampanoag Tribe of Massachusetts.

In these letters and consultation meetings, BOEM requested information from consulting parties on historic properties that may be potentially affected by the proposed undertaking.

BOEM intends to send technical reports pertinent to Section 106 consultation, including a memorandum summarizing the methodology for identifying the APE (ERM 2022), to consulting parties prior to publication of the Draft EIS. BOEM plans to continue consulting with state historic preservation offices, the ACHP, National Park Service (NPS), federally recognized Tribal Nations, and the consulting parties to seek their comments and input regarding the effects of the undertaking on historic properties and the resolution of adverse effects including the development and implementation of treatment plans. BOEM intends to have at least three additional consultation meetings with all parties to receive final input about BOEM's plans for mitigations.

## J.3 Application of the Criteria of Adverse Effect

The Criteria of Adverse Effect under NHPA 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 inclusion in 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.

Adverse effects on historic properties include, but are not limited to (36 CFR § 800.5(a)(2)):

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 Part 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 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.

Based on the studies conducted to identify historic properties within the proposed Project's marine APE, terrestrial APE, and visual APE and the assessment of effects upon those properties determined with consulting parties, BOEM has found the proposed Project would have an adverse effect on seven historic properties within the visual APE and 49 ancient submerged landform features identified within the marine APE, including the SWDA, OECC, and SCV. The assessment of visual effects considers the findings of the applicant's visual simulations and visual effects simulations of the proposed Project (COP Appendix III-H.b; Epsilon 2022), as well as BOEM's Cumulative Historic Resources Visual Effects Assessment (BOEM 2022b), which evaluated the visual effects of the proposed undertaking in relation to the visual effects from all other offshore wind projects in the Rhode Island and Massachusetts Lease Areas. The assessments in this section consider the four criteria established for potential inclusion in the National Register of Historic Places (NRHP) (NPS 1995), which identify historic properties:

- Criterion A—That are associated with events that have made a significant contribution to the broad patterns of our history; or
- Criterion B—That are associated with the lives of persons significant in our past; or

- Criterion C—That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- Criterion D—That have yielded or may be likely to yield, information important in prehistory or history.

### J.3.1 Assessment of Effects on Historic Properties in the Visual Area of Potential Effects

#### J.3.1.1 Gay Head Lighthouse, Martha's Vineyard

Gay Head Lighthouse is located on the southwestern most portion of the island of Martha's Vineyard, marking Devil's Bridge rocks, the shoals of the south shore of the island, and the entrance to Vineyard Sound from Buzzard's Bay on the route to Boston Harbor from the south. It was listed on the NRHP in 1987 as part of the Lights of Massachusetts Thematic Resources Area and is significant under the NRHP's Criteria A and C as a historic maritime structure and aid to navigation (DiStefano and Salzman 1981; Massachusetts Historical Commission 2015; and COP Section 6.2, Appendix III-H.b; Epsilon 2022).

Constructed in 1855-1856, the Gay Head Lighthouse was once one of the ten most important lights on the Atlantic Coast and originally contained one of the country's first Fresnel lenses. The brick and sandstone tower meets Criterion A for its association with the island's maritime history as an aid to navigation. The structure also meets Criterion C as an example of a 19th century maritime structure constructed of bricks using the clay from the Gay Head Cliffs. The 1856 lighthouse, a brick tower 45 feet in height, is the only remaining structure at the site; the original brick Keeper's House was replaced by a wooden house in 1906 and was torn down in 1961. Although the lighthouse was moved from its original location 150 feet east in 2015 and its setting and location are partially compromised, the structure retains integrity of design, material, workmanship, feeling, and association (DiStefano and Salzman 1981; Massachusetts Historical Commission 2015; and COP Section 6.2, Appendix III-H.b; Epsilon 2022).

The applicant's visual effects study concluded that the proposed Project would adversely affect the maritime setting of the Gay Head Lighthouse and its viewshed through the introduction of new elements out of character with the historic setting, feeling, and association, thereby diminishing its integrity. The applicant's analysis of the visibility of the proposed Project used the algorithm presented in OCS Study BOEM 2017-037 (BOEM 2017b). Based on the applicant's analysis, the project would be visible from the Gay Head Lighthouse, on average, 18 percent of the time annually (36 percent during the day and nearly 0 percent at night annually, due to use of an aircraft detection and lighting system [ADLS]) (COP Appendix III-H.b, Section 4.2; Epsilon 2022).

BOEM's (2022b) study of cumulative visual effects from offshore wind projects concluded that the proposed undertaking comprised approximately 17 percent of all theoretically visible WTG blade tips. The study also analyzed the number of WTGs theoretically visible from the Gay Head Lighthouse using three different tiered distances (10 to 20, 20 to 30, and 30 to 40 nautical miles [11.5 to 23, 23 to 34.5, and 34.5 to 46 miles]). This part of the study found that the proposed WTGs would comprise none of the WTGs visible within 20 nautical miles (23 miles), 24 percent of all WTGs visible at 20 to 30 nautical miles (23 to 34.5 miles), and 15 percent of all WTGs visible beyond 30 nautical miles (34.5 miles). In clear weather, proposed WTGs would be visible from the Gay Head Lighthouse and the surrounding property in views to the southeast. In views to the south, proposed WTGs would be theoretically visible in the far left of the observer's field of view and would be less noticeable to the casual observer than WTGs associated with other projects located in closer proximity to the Gay Head Lighthouse. The proposed WTGs would disappear from the field of view as the observer turns to the west. Overall, the undertaking would contribute minimally to the cumulative visual effects of offshore wind on the Gay Head Lighthouse (BOEM 2022b; COP Appendix III-H.b; Epsilon 2022).

In summary, other projects' WTGs would occupy the majority of the horizon line, and all of the open ocean horizon visible in 124-degree southward views from the Gay Head Lighthouse. WTGs associated with other projects are situated in front of the proposed Project's WTGs. While the proposed Project's WTGs would contribute to visual impacts on clear days by creating additional visual clutter on the southeast horizon, they would be visible less often due to weather conditions, and less visually prominent than other projects' WTGs due to distance (BOEM 2022b).

### J.3.1.2 Edwin Vanderhoop Homestead (Aquinnah Cultural Center)

The Edwin Vanderhoop Homestead (also known as the Aquinnah Cultural Center; GAY.40/ NRHP06000784) is a late 19th century two-story wood-frame, vernacular residence constructed sometime between 1890 and 1897. In 2006, the Edwin Vanderhoop Homestead was restored and opened as the Aquinnah Cultural Center. The property is eligible under Criteria A and C and is significant at the local level in the areas of architecture, Native American ethnic history, and social history.

The applicant's assessment of the visual effects of the proposed Project on the Edwin Vanderhoop Homestead/Aquinnah Cultural Center found that the setting, as it related to Criterion C, would be affected through the introduction of new elements; however, the view from the Homestead toward the SWDA is partially obstructed by topography and mature tree growth to the southeast. The view of the SWDA is possible to the south.

The applicant's visual effects study concluded that the proposed Project would adversely affect the maritime setting of the Edwin Vanderhoop Homestead and its viewshed through the introduction of new elements out of character with the historic setting, feeling, and association, thereby diminishing its integrity under Criterion C. (COP Appendix III-H.b; Epsilon 2022).

BOEM has concluded that the undertaking adversely affects the maritime setting of the Edwin Vanderhoop Homestead (Aquinnah Cultural Center) and its viewshed through the introduction of new ocean-founded visual elements out of character with the historic setting, feeling, and association, thereby diminishing its integrity. Existing topography and mature tree growth to the south and west partially obstruct the ocean view.

Based on reported visibilities at Martha's Vineyard Airport accounting for the use of ADLS, the applicant estimated that the ocean view from the Edwin Vanderhoop Homestead (Aquinnah Cultural Center), to the south and the west would be obstructed by the undertaking's new ocean-founded visual elements less than 42 percent of the time annually (COP Appendix III-H.b, Section 6.2; Epsilon 2022). Using the analysis for Gay Head Lighthouse, approximately 855 feet north of the Vanderhoop property, and using BOEM's (2017b) visibility algorithm, the proposed Project would be visible at least 18 percent of the time annually (36 percent during the day and nearly 0 percent at night annually, due to use of ADLS) (COP Appendix III-H.b, Section 4.2; Epsilon 2022).

BOEM's (2022b) study of cumulative visual effects from offshore wind projects concluded that for the Edwin Vanderhoop Homestead (Aquinnah Cultural Center), the proposed undertaking comprised approximately 17 percent of all theoretically visible WTG blade tips. The study also analyzed the number of WTGs theoretically visible from the Edwin Vanderhoop Homestead (Aquinnah Cultural Center) using three different tiered distances (10 to 20, 20 to 30, and 30 to 40 nautical miles [11.5 to 23, 23 to 34.5, and 34.5 to 46 miles]). This part of the study found that the proposed WTGs would comprise none of the WTGs visible within 20 nautical miles (23 miles), 24 percent of all WTGs visible at 20 to 30 nautical miles (23 to 34.5 miles), and 15 percent of all WTGs visible beyond 30 nautical miles (34.5 miles). In clear weather, proposed WTGs would be visible from the Edwin Vanderhoop Homestead (Aquinnah Cultural Center) and the surrounding property in views to the southeast. In views to the south, proposed WTGs would be theoretically visible in the far left of the observer's field of view and would be less noticeable to the casual observer than WTGs associated with other projects located in closer proximity to the Homestead. The proposed WTGs would disappear from the field of view as the observer turns to the west. Overall, the undertaking would contribute minimally to the cumulative visual effects of offshore wind on Edwin Vanderhoop Homestead (Aquinnah Cultural Center) (BOEM 2022b; COP Appendix III-H.b; Epsilon 2022).

In summary, other projects' WTGs would occupy the majority of the horizon line, and all of the open ocean horizon visible in 124-degree southward views from the Edwin Vanderhoop Homestead (Aquinnah Cultural Center). WTGs associated with other projects are situated in front of the undertaking's WTGs. While the proposed Project's WTGs would contribute to visual impacts on clear days by creating additional visual clutter on the southeast horizon, they would be visible less often due to weather conditions, and less visually prominent than other projects' WTGs due to distance (BOEM 2022b).

### J.3.1.3 Gay Head–Aquinnah Shops Area

A cluster of nine commercial buildings, the Gay Head–Aquinnah Shops Area (Aquinnah Shops Area; GAY.B), was constructed during the early to mid-20th century. The buildings overlook the Atlantic Ocean at the western tip of a circle formed by the intersection of Lighthouse Road and South Road and line the north and south sides of the walkway leading up to the Clay Cliffs of Aquinnah Scenic Overlook. The buildings form a U-shape and were constructed due to the increase of tourism to the cliffs that began during the early 20th century.

The applicant's visual effects study concluded that the proposed Project would adversely affect the maritime setting of the Gay Head–Aquinnah Shops Area and its viewshed through the introduction of new elements out of character with the historic setting, feeling, and association, thereby diminishing its integrity under Criterion C (Epsilon 2022).

BOEM has concluded that the undertaking would adversely affect the maritime setting of the Aquinnah Shops Area and its viewshed through the introduction of new ocean-founded visual elements that are out of character with the historic setting, feeling, and association, thereby diminishing its integrity. The undertaking is partially visible to the west from the Aquinnah Shops Area, owing to the Aquinnah Cliffs located to the north, west, and south of the Gay Head–Aquinnah Shops Area. Existing power lines and other modern elements already within the foreground of portions of the view are not located on the ocean, the association and historic feeling of which is integral to this property's setting; thus, their existence does not serve to remove nor offset the effect on the property resulting from the introduction of new ocean-founded visual elements in the proposed Project COP (Appendix III-H.b, Section 6.2; Epsilon 2022(COP Appendix III-H.b, Section 6.2; Epsilon 2022).

Based on reported visibilities at Martha's Vineyard Airport and accounting for the use of ADLS, the applicant estimated that the ocean view from the Aquinnah Shops Area to the south and the west would be obstructed by the undertaking's new ocean-founded visual elements less than 42 percent of the time annually (COP Section 4.2, Appendix III-H.b; Epsilon 2022). Using the additional analysis for Gay Head Lighthouse, approximately 706 feet north-northeast of the Aquinnah Shops Area property, and using BOEM's (2017b) visibility algorithm, the undertaking would be visible at least 18 percent of the time annually (36 percent during the day and nearly 0 percent at night annually, due to use of ADLS) (COP Section 4.2, Appendix III-H.b; Epsilon 2022).

BOEM's (2022b) study of cumulative visual effects from offshore wind projects concluded that for the Aquinnah Shops Area, the undertaking comprised approximately 17 percent of all theoretically visible WTG blade tips. The study also analyzed the number of WTGs theoretically visible from the Aquinnah Shops Area using three different tiered distances (10 to 20, 20 to 30, and 30 to 40 nautical miles [11.5 to 23, 23 to 34.5, and 34.5 to 46 miles]). This part of the study found that the proposed WTGs would comprise none of the WTGs visible within 20 nautical miles (23 miles), 24 percent of all WTGs visible at 20 to 30 nautical miles (23 to 34.5 miles), and approximately 15 percent of all WTGs visible beyond 30 nautical miles (34.5 miles). In clear weather, proposed WTGs would be visible from the Aquinnah Shops Area and the surrounding property in views to the southeast. In views to the south, proposed WTGs would be theoretically visible in the far left of the observer's field of view and would be less noticeable to the casual observer than WTGs associated with other projects located in closer proximity to the Aquinnah Shops Area. The undertaking's WTGs would disappear from the field of view as the observer turns to the west. Overall, the undertaking would contribute minimally to the cumulative visual effects of offshore wind on Aquinnah Shops Area (BOEM 2022b; COP Appendix III-H.b; Epsilon 2022).

In summary, other projects' WTGs would occupy the majority of the horizon line, and all of the open ocean horizon visible in 124-degree southward views from the Aquinnah Shops Area. WTGs associated with other projects are situated in front of the undertaking's WTGs. While the proposed Project's WTGs would contribute to visual impacts on clear days by creating additional visual clutter on the southeast horizon, they would be visible less often due to weather conditions, and less visually prominent than other projects' WTGs due to distance (BOEM 2022b).

#### J.3.1.4 Nantucket Historic District National Historic Landmark

Situated approximately 30 miles south of Cape Cod, Massachusetts, the Nantucket District NHL comprises the entirety of the islands of Nantucket, Tuckernuck, and Muskeget. Combined, the three islands occupy approximately 28,000 acres, and contain 5,027 contributing resources (which constitute approximately half of the total number of contributing and non-contributing resources) located within the historic district. In 1955, Nantucket became one of the first local historic districts in Massachusetts and one of the earliest local historic districts in the nation through special legislation initiated by the town and enacted by the Commonwealth of Massachusetts. The Nantucket District NHL was listed on the NRHP in 1967, with several more recent updates, notably in 1975 and 2012 (Chase-Harrell and Pfeiffer 2012; Heintzelman 1975; and COP Appendix III-H.b, Section 6.3; Epsilon 2022).

According to the 2012 Landmark nomination,

> The 1966 National Historic Landmark nomination for Nantucket focused entirely on its association with the American whaling industry (NHL Criterion 1) and the remarkable survival of the architecture and ambiance of an early whaling port (NHL Criterion 4), and the period of significance ended with the decline of whaling on Nantucket. While whaling built Nantucket, other factors preserved it; tourism replaced whaling as the island's economic mainstay, and historic preservation took early root on the island. With the passage of time, the importance of these factors in preserving the island's character has become apparent, and it is the purpose of this update to establish the national significance of tourism and historic preservation as well as whaling on Nantucket and to extend the period of significance to 1975, when the last element of governmental protection of the island was set in place by the expansion of the National Historic Landmark District to include the entirety of the island. This expansion followed the 1971 expansion of the local historic district to encompass the entire island as well as the outlying islands of Tuckernuck and Muskeget. These updates also recognize Nantucket's Native American and African-American communities and the important roles that they played in the whaling industry and the social history of the island (Chase-Harrell and Pfeiffer 2012).

The Nantucket District NHL is significant under Criterion A for its association with the development of Nantucket and the whaling industry, Criterion C for architectural examples including Georgian, Federal, Greek Revival, Italianate, Shingle and Colonial Revival, and Criterion D for the potential archaeological remains associated with Native American pre- and post-Contact use as well as historical archaeology. Despite modern construction and intrusions, it retains integrity of location, design, setting, material, workmanship, feeling, and association (Chase-Harrell and Pfeiffer 2012; Heintzelman 1975; and COP Section 6.3, Appendix III-H.b; Epsilon 2022).

The applicant's assessment of the visual effects of the proposed Project on the Nantucket District NHL found that the maritime setting of the Nantucket District NHL and its viewshed would be altered through the introduction of new elements; however, the applicant concluded that the undertaking would ultimately have no adverse effect on the Nantucket District NHL (COP Appendix III-H.b; Epsilon 2022). Specifically, the applicant found that the proposed Project would not be distinguishable, even in ideal weather conditions. Views to the southern direction would be affected, but the WTGs would appear as cloud shadows or other atmospheric phenomena (COP Appendix III-H.b; Epsilon 2022).

BOEM has concluded that the undertaking would adversely affect the Nantucket District NHL through the introduction of new ocean-founded visual elements that are out of character with the historic setting, feeling, and association of the resource, thereby diminishing its integrity. While the proposed undertaking is only partially visible from the Nantucket District NHL, and meteorological conditions would often obscure the view of the proposed Project, making it visible primarily during ideal weather conditions, the existence of the undertaking's visual elements ultimately are out of character and thus adversely affect the NHL.

Based on reported visibilities at Nantucket Memorial Airport and accounting for the use of ADLS, the applicant estimated that the ocean view from the Nantucket District NHL would be obstructed by the undertaking's new ocean-founded visual elements less than 37 percent of the time annually (COP Appendix III-H.b, Section 4.2; Epsilon 2022). Based on BOEM's (2017b) visibility algorithm, the proposed Project would be visible from the Nantucket District NHL approximately 14 percent of the time annually (27 percent during the day and nearly 0 percent at night due to use of ADLS (COP Appendix III-H.b, Section 4.2; Epsilon 2022)

BOEM's (2022b) study of cumulative visual effects from offshore wind projects concluded that for the Nantucket District NHL, the undertaking comprised between 15 and 21 percent of all theoretically visible WTG blade tips, while theoretically visible nacelle-top lights from the proposed Project would comprise 0 to 25 percent of total theoretically visible nacelle-top lights, depending on location. The study also analyzed the number of WTGs theoretically visible from the Nantucket District NHL using three different tiered distances (10 to 20, 20 to 30, and 30 to 40 nautical miles [11.5 to 23, 23 to 34.5, and 34.5 to 46 miles]). This part of the study found that none of the proposed Project's WTGs would be within 20 nautical miles (23 miles) of the Nantucket District NHL, while proposed Project WTGs would comprise 26 percent of all WTGs visible within 20 to 30 nautical miles (23 to 34.5 miles), and 13 percent of the WTGs visible beyond 30 nautical miles (34.5 miles). The WTGs associated with the undertaking would be visible from the Nantucket District NHL in views to the southwest. Views are mostly limited to beachfront areas, and views from the interior portion of the NHL would be rare due to screening by topography and/or vegetation. An observer can experience panoramic views of the open ocean from the beachfront and would also potentially experience views of WTGs from more than one project as they travel between the northwest and southeast shoreline. Overall, the undertaking would contribute less than other projects to the cumulative visual effects of offshore wind on Nantucket District NHL. Also, WTGs would not be visible from approximately 80 percent of the Nantucket District NHL, which means only about 20 percent of the island would experience adverse visual effects on their southern viewshed (COP Appendix III-H.b; Epsilon 2022).

In summary, WTGs from other projects would occupy a greater extent of the horizon line and would be closer and more frequently visible than the undertaking's WTGs due to atmospheric and weather conditions. None of the proposed undertaking's WTGs would be in the nearest distance zone (10 to 20 nautical miles [11.5 to 23 miles]). All of the undertaking's WTGs would be behind WTGs from other projects and would be visible less frequently and less noticeable to the casual observer in clear conditions (BOEM 2022b).

### J.3.1.5 Chappaquiddick Island Traditional Cultural Property

BOEM determined Chappaquiddick Island to be potentially eligible for listing on the NRHP as a TCP (BOEM 2020b). The designation does not contain specific boundaries. BOEM found that the TCP is significant under Criterion A for "its association with and importance in maintaining the continuing cultural identity of the community" (BOEM 2020b). BOEM considers eight locations to comprise contributing elements of the Chappaquiddick Island TCP. Of these eight areas, six are considered to be within the APE. The traditional viewsheds would be altered by the introduction of human-made structures where no structures previously existed.

The applicant's assessment of the visual effects of the proposed Project on the Chappaquiddick Island TCP found that the setting would be minimally altered through the introduction of new elements, and specifically, the undertaking would only be visible from a portion of Chappaquiddick Island, as well as Norton Point and Katama Bay. Views to the north, east, and west from these locations would not be affected. The applicant stated that views of the proposed Project would be intermittent and only possible during ideal weather conditions, where the proposed Project would be barely distinguishable at the horizon line, especially without foreknowledge of the proposed Project.

Based on reported visibilities at Martha's Vineyard Airport and accounting for the use of ADLS, the applicant estimated that the ocean view from the Chappaquiddick Island TCP would be obstructed by the proposed undertaking's new ocean-founded visual elements less than 42 percent of the time in a given year (COP Appendix III-H.b; Section 4.2; Epsilon 2022). By comparison, using BOEM's (2017b) visibility algorithm, the proposed Project would be visible from the Chappaquiddick Island TCP approximately 22 percent of the time annually (43 percent during the day and nearly 0 percent at night due to the use of ADLS) (COP Appendix III-H.b, Section 4.2; Epsilon 2022).

BOEM has concluded that the TCP's traditional viewshed would be adversely affected through the introduction of the undertaking's new ocean-founded visual elements that are out of character with the historic setting, feeling, and association of the resource, thereby diminishing its integrity.

BOEM's (2022b) study of cumulative visual effects from offshore wind projects that the proposed WTGs would comprise between 6 and 16 percent of all visible WTGs and 20 to 23 percent of total nacelle tops theoretically visible from the Chappaquiddick Island TCP (which includes the Chappaquiddick Lots). This study also analyzed the number of WTGs theoretically visible from the Chappaquiddick Island TCP using three different tiered distances (10 to 20, 20 to 30, and 30 to 40 nautical miles [11.5 to 23, 23 to 34.5, and 34.5 to 46 miles]). This part of the study found that the proposed WTGs would comprise none of the proposed WTGs within 10 to 20 nautical miles (11.5 to 23 miles), 27 percent of all WTGs visible at 20 to 30 nautical miles (23 to 34.5 miles), and 10 percent of all WTGs visible beyond 30 nautical miles (34.5 miles). An observer would be able to experience panoramic views of the ocean from the beachfront and some inland waters of the Chappaquiddick Island TCP. In clear weather, the WTGs associated with the undertaking would be visible from portions of the Chappaquiddick Island TCP in views to the south. Views of undertaking and other projects' WTGs from the interior of the TCP would be rare, due to screening by topography and/or vegetation. The proposed WTGs and other offshore wind project WTGs would appear similar as the observer moves between the east and west beachfront areas of the property.

Overall, in clear conditions the undertaking would contribute approximately less than a quarter of the cumulative visual effects of offshore wind development on Chappaquiddick Island TCP. However, although WTGs would not be visible from 41 percent of the Chappaquiddick Island TCP, 59 percent of the island would have adverse visual effects on their southern viewshed (BOEM 2022b; COP Appendix III-H.b; Epsilon 2022).

In summary, WTGs from other projects would occupy a greater extent of the horizon line and are situated in front of the proposed Project WTGs. The proposed Project's WTGs would occupy a smaller extent of the horizon line and would be less noticeable to other project WTGs in a similar distance zone due to proximity. Both proposed Project and other project WTGs are unlikely to be missed by the casual observer, but the overall view would still be dominated by sea and sky (BOEM 2022b).

### J.3.1.6 Vineyard Sound and Moshup's Bridge Traditional Cultural Property

The Vineyard Sound Moshup's Bridge TCP is considered eligible for listing in the NRHP under all four Criteria (A through D).

The maritime setting of Vineyard Sound and Moshup's Bridge TCP is an integral element to the resource's historical and cultural significance. The majority of the inland area of the TCP would have no visibility of the proposed undertaking, as it would be limited by the topographic changes and mature vegetation cover. The nearest WTG or ESP position is located approximately 16.8 miles to the south from the TCP. The proposed undertaking would be visible across the seascape portion of the TCP. Therefore, the proposed Project would have an adverse effect on the Vineyard Sound and Moshup's Bridge TCP by changing the character of the TCP's traditional setting. Finally, the proposed undertaking would only be visible from the TCP's southern view. All other views from the TCP would remain unaffected (COP Appendix III-H.b, Section 4.2; Epsilon 2022).

Based on reported visibilities at Martha's Vineyard Airport and accounting for the use of ADLS, the ocean view from the Vineyard Sound and Moshup's Bridge TCP would be obstructed by the proposed undertaking's new ocean-founded visual elements less than 42 percent of the time annually (COP Section 4.2, Appendix III-H.b; Epsilon 2022). By comparison using the additional analysis for Gay Head Lighthouse, and using BOEM's (2017b) visibility algorithm the proposed Project would be visible at least 18 percent of the time annually (36 percent during the day and nearly 0 percent at night due to use of ADLS) (COP Appendix III-H.b).

BOEM's (2022b) study of cumulative visual effects from offshore wind projects evaluated the Vineyard Sound and Moshup's Bridge TCP from a viewpoint on the cliffs near Squibnocket Point. BOEM's study concluded that the undertaking comprised 15 percent of all theoretically visible WTG blade tips from Squibnocket Point and 16 percent of theoretically visible nacelle-top lights, depending on viewer location. The study also analyzed the number of WTGs theoretically visible from the Vineyard Sound and Moshup's Bridge TCP using three different tiered distances (10 to 20, 20 to 30, and 30 to 40 nautical miles [11.5 to 23, 23 to 34.5, and 34.5 to 46 miles]). This part of the study found that the proposed undertaking's WTGs would comprise 3 percent of all WTGs visible at 10 to 20 nautical miles (11.5 to 23 miles), 29 percent of all WTGs visible at 20 to 30 nautical miles (23 to 34.5 miles), and 4 percent of all WTGs visible beyond 30 nautical miles.

No visual simulations were prepared specifically for the Vineyard Sound and Moshup's Bridge TCP, but the Aquinnah Cultural Center, used as a point for the Gay Head Lighthouse analysis. Squibnocket Point is approximately 4.5 miles closer to the undertaking than the Aquinnah Cultural Center and would have unobstructed ocean views of the proposed WTGs. When viewed from Squibnocket Point, the WTGs from the undertaking and other projects would be marginally larger and more prominent than if viewed from the Aquinnah Cultural Center. An observer would be able to experience panoramic views of the ocean from the bluffs at Squibnocket Point. In clear weather, this view would include the proposed undertaking's WTGs to the southeast. However, WTGs from other projects would be in between the observer and the proposed Project's WTGs. Views from the proposed undertaking and other projects' WTGs from the interior of the TCP would be rare, due to screening by topography and/or other vegetation. The proposed undertaking's WTGs and other offshore wind project WTGs would appear similar as the observer moves across the bluffs along Squibnocket Point. Overall, the undertaking would contribute less than one-quarter of the cumulative visual effects of offshore wind on the TCP (BOEM 2022b; COP Appendix III-H.b; Epsilon 2022).

In summary, other projects' WTGs would occupy the majority of the horizon line and the entirety of the horizon line visible in 124-degree southward views from Squibnocket Point. WTGs associated with other projects are situated in front of the undertaking's WTGs. While the proposed undertaking's WTGs would contribute to visual impacts on clear days by creating additional visual clutter on the southeast horizon, they would be visible less often due to weather conditions, and less visually prominent than other projects' WTGs due to distance and the proposed undertaking's location behind WTGs from other projects. The WTGs from the proposed undertaking and other projects would be plainly visible to an observer, but the overall view would still be dominated by sea and sky (BOEM 2022b).

#### J.3.1.7 Nantucket Sound Traditional Cultural Property

The Nantucket Sound TCP has been determined eligible for listing in the NRHP under all four criteria (A through D); however, the boundary has not been fully defined.

The applicant's assessment of the visual effects of the proposed Project on the Nantucket Sound TCP found that the setting would be minimally altered through the introduction of new elements, and specifically, the undertaking would only be visible intermittently from the southern end of Nantucket Sound. Views to the north, east, and west from Nantucket Sound would not be affected. The applicant stated that views of the proposed Project would be intermittent and only possible during ideal weather conditions, where the proposed Project would be slightly visible above the horizon line.

Based on reported visibilities at Martha's Vineyard Airport and accounting for the use of ADLS, the applicant estimated that the ocean view from the Nantucket Sound TCP would be obstructed by the proposed undertaking's new ocean-founded visual elements less than 42 percent of the time in a given year (COP Appendix III-H.b; Section 4.2; Epsilon 2022). By comparison using BOEM's (2017b) visibility algorithm, the proposed Project would be visible from the Nantucket Sound TCP approximately 22 percent of the time annually (43 percent during the day and nearly 0 percent at night due to the use of ADLS) (COP Appendix III-H.b, Section 4.2; Epsilon 2022).

BOEM has concluded that the TCP's traditional viewshed would be adversely affected through the introduction of the undertaking's new ocean-founded visual elements that are out of character with the historic setting, feeling, and association of the resource, thereby diminishing its integrity.

BOEM's (2022b) study of cumulative visual effects from offshore wind projects concluded that the proposed WTGs would comprise between approximately 12 percent of all visible WTG blade tips and 3 percent of all visible nacelle-top lights from the East Beach location. This study also analyzed the number of WTGs theoretically visible from the Nantucket Sound TCP using three different tiered distances (10 to 20, 20 to 30, and 30 to 40 nautical miles [11.5 to 23, 23 to 34.5, and 34.5 to 46 miles]). This part of the study found that the proposed Project's WTGs would comprise none of all WTGs within 20 nautical miles (23 miles), 23 percent of all WTGs visible at 20 to 30 nautical miles (23 to 34.5 miles), and 15 percent of the WTGs visible beyond 30 nautical miles (34.5 miles). An observer would be able to experience panoramic views of the ocean from the beachfront and some inland waters of the Nantucket Sound TCP. In clear weather, the WTGs associated with the undertaking would be visible from portions of the Nantucket Sound TCP in views to the southeast. Views of undertaking and other projects' WTGs from the interior of the TCP would be rare, due to screening by topography and/or vegetation. The proposed WTGs and other offshore wind project WTGs would appear similar as the observer moves between the east and west beachfront areas of the property. Overall, in clear conditions the undertaking would contribute less than 25 percent of the cumulative visual effects of offshore wind development on Nantucket Sound TCP (BOEM 2022b).

In summary, WTGs from other projects would occupy a greater extent of the horizon line, meaning proposed Project WTGs would be less noticeable than other project WTGs in similar distance zone due to proximity. Both proposed Project and other project WTGs are unlikely to be missed by the casual observer, but the overall view would still be dominated by sea and sky (BOEM 2022b).

### J.3.2 Assessment of Effects on Historic Properties in the Marine Area of Potential Effects

This section discusses effects on ancient submerged landforms as contributing elements to the Nantucket Sound TCP. Documentary and field research conducted as part of the marine APE cultural resource investigations demonstrate that submerged portions of the proposed Project area were subaerial during and immediately following the last glacial maximum. The cultural resources investigations in the marine APE identified ancient submerged landform features (including stream channel, lake, and estuarine landscape features) within the marine APE that have the potential to contain pre-Contact Native American archaeological sites dating prior to the inundation of the OCS during the late Pleistocene and early Holocene (COP Appendix II-D, Section 5; Epsilon 2022). A 2020 archaeological geotechnical campaign conducted in part as a due diligence measure to identify archaeological potential, did not find any direct evidence of pre-Contact Native American cultural materials. However, the ancient landforms are considered archaeologically sensitive due to the potential for undiscovered archaeological materials to be present (COP Appendix II-D, Section 5; Epsilon 2022). A total of 15 ancient submerged landform features were identified in the marine APE for the SWDA, 16 ancient submerged landform features in the marine APE for the OECC, 3 ancient submerged landform features in the marine APE for the Western Muskeget Variant OECC, and 17 ancient submerged landform features in the marine APE for the SCV.

If archaeological resources are present within the identified ancient landforms and they retain sufficient integrity, these resources could be eligible for listing on the NRHP under Criterion D. During the last glacial maximum, at around 24,000 before present (B.P.), sea levels dropped approximately 180 to 85 feet below today's level. Sea level did not reach a near modern level until approximately 3,000 B.P. in the New England area. Consequently, a large amount of land on the OCS was exposed and existed as terrestrial land during the late Pleistocene and early Holocene. Native American oral histories and archaeological evidence demonstrate that Native American populations were present in the New England region, over 86 nautical miles (99 miles) inland from the coast at the time that the OCS was exposed. It is logical to assume that these people would have also occupied the now-submerged landscape on the OCS (Tuttle et al. 2019). Due to current technological constraints, very little archaeological information has been recovered from late Pleistocene and early Holocene archaeological sites on the OCS. As a result, very little archaeological material has been recovered related to Native American adaptations and lifeways on the then coastal plain and coast. Any archaeological information preserved within these sites, if present, would likely yield significant information important in the pre-Contact history of the region, making the sites eligible for NRHP listing under Criterion D.

In addition to the archaeological potential of these resources, all 19 ancient landforms identified along the OECC and the Western Muskeget Variant are contributing elements to the Nantucket Sound TCP due to their cultural significance to Native American tribes (COP Appendix A, Vol II-D, Epsilon 2022). Nantucket Sound is eligible for listing in the NRHP as a TCP and as a historic and archaeological property that has yielded and has the potential to yield important information. Although the exact boundary is not precisely defined, the ACHP determination indicated that the sound is eligible as an integral, contributing feature of a larger district under all NRHP Criteria.

An additional 15 ancient submerged landform features were identified within the SWDA, outside of Nantucket Sound, on the OCS. Although these landforms are not contributing elements to the Nantucket Sound TCP, they have the potential for preserved, pre-Contact cultural materials that date to late Pleistocene and early Holocene. This is particularly true of the small, isolated paleo-streams valleys that were identified in the northern and western portions of the SWDA, locations that carry high potential for intact archaeological deposits. Due to their location on the OCS, these landforms would have been exposed during the last glacial maximum, and any cultural materials within these landforms would almost certainly date to the Paleoindian Period—as it is currently defined dating to 12,000 years B.P., if not earlier—and may thus contain the remains of or other cultural materials associated with, some of the first peoples of the Americas.

Federally recognized tribes have stated that all of the ancient submerged landform features identified within the marine APE, regardless of whether or not they contain archaeological data, are significant resources as vestiges of the landscape occupied by their ancestors and as the locations where events from tribal oral histories occurred. As a result, the ancient landform features identified within the marine APE could be eligible for listing on the NRHP under Criterion A of the NRHP Criteria due to their association with significant events, or series of events, significant to the cultural traditions and history of local Native American tribes.

The proposed Project would be able to avoid two of the 15 ancient submerged landform features present within the marine archaeology APE in the SWDA and would result in direct physical effects on the 49 other ancient submerged landforms that cannot be avoided, including 19 features that are contributing elements to the Nantucket Sound TCP. Direct physical effects on these resources would threaten the viability of the affected portion of these resources as both potential repositories of archaeological information as well as the cultural significance of these landforms to local Native American tribes. The severity of effects would depend on the horizontal and vertical extent of effects relative to the size of the intact ancient submerged landform. Due to the size of the offshore remote sensing survey areas in the OECC and SWDA, the full extent or size of individual ancient landforms cannot be defined. However, based on available information, construction of the proposed undertaking would result in the physical damage or destruction of at least a portion of each of the ancient landforms that cannot be avoided.

There are 17 ancient submerged landforms within the SCV footprint in federal waters. It may not be possible to avoid the ancient submerged landforms in the SCV. If avoidance is not possible, the proposed undertaking would result in the physical damage or destruction of at least a portion of the identified resources that cannot be avoided and adverse effects on these ancient submerged landforms.

Based on the information available from the marine archaeological resources surveys of the marine APE and the assessment of effects upon those properties, BOEM has found that the undertaking would result in direct adverse physical effects on 49 of the ancient submerged landforms that cannot be avoided in the OECC and SWDA. Two ancient submerged landforms will be avoided and would not be adversely affected. The undertaking would result in the permanent, physical destruction of or damage to all or part of each of the 49 ancient landforms that cannot be avoided. In addition, 19 of the 49 ancient submerged landforms that would be adversely affected by construction of the undertaking are located in Nantucket Sound and are likely contributing elements to the Nantucket Sound TCP.

### J.3.3 Assessment of Effects on Shipwrecks and Potential Shipwrecks

Archaeological surveys within the marine archaeology portion of the APE identified eight potential shipwrecks in the OECC, SWDA, SCV, and Western Muskeget Variant, combined (COP Volume II-D, Section 5; COP Volume II-D, Section 5; and Appendix A; Epsilon 2022). All eight potential shipwrecks will be avoided with sufficient buffers by all proposed Project activities that are part of the undertaking; as a result, there would be no adverse effects on these potential historic properties.

### J.3.4 Assessment of Effects on Historic Properties within the Terrestrial Area of Potential Effects

Both reconnaissance and intensive level archaeological surveys were conducted within the terrestrial archaeology portion of the APE for Phase 1. These surveys identified no NRHP eligible or listed sites. No additional archaeological investigations of the onshore components are planned. As currently designed, BOEM finds there will be no adverse effects on historic properties within the Phase 1 terrestrial archaeology APE.

The Phase 2 archaeological survey is still pending for the proposed onshore substation sites(s) and additional route segments and potential additional parcels near the onshore substation. This is part of a phased identification and evaluation of historic properties pursuant to 36 CFR § 800.4(b)(2). BOEM will conduct Section 106 consultation for the remainder of the Phase 2 terrestrial archaeology APE with the Massachusetts SHPO, ACHP, federally recognized Tribal Nations, and other identified consulting parties. The effects of the undertaking on historic properties would be evaluated prior to the Final EIS.

### J.3.5 Assessment of Effects on Historic Properties

Based on the information available to BOEM from the studies conducted to identify historic properties within the visual APE for the undertaking and the assessment of effects upon those properties determined in consultation with the consulting parties, BOEM finds that the undertaking would have a direct adverse visual effect on the Gay Head Lighthouse, Edwin Vanderhoop Homestead (Aquinnah Cultural Center), the Gay Head–Aquinnah Shops Area, the Nantucket District NHL, the Chappaquiddick Island TCP, and the Nantucket Sound TCP. The undertaking would affect the character of the properties' setting that contributes to their historic significance by introducing visual elements that are out of character with the historic setting of the properties. However, BOEM determined that due to the distance and open viewshed, the integrity of the properties would not be so diminished as to disqualify any of them for NRHP eligibility.

The adverse effects on the viewshed of the aboveground historic properties would occupy the space for approximately 30 years, but they are unavoidable for reasons discussed in Section J.4.3. This application of the Criteria of Adverse Effect and determination that the effects are direct is based on pertinent NRHP Bulletins, subsequent clarification and guidance by the NPS and ACHP, and other documentation, including professionally prepared viewshed assessments and computer-simulated photographs and video.

## J.4 Measures to Avoid, Minimize, or Mitigate Adverse Effects

BOEM will stipulate measures to avoid, minimize, or mitigate adverse effects on historic properties identified in the APE as adversely affected by the proposed Project. Specifically, BOEM will stipulate measures to avoid known terrestrial archaeological resources and submerged archaeological and ancient submerged landforms, as well as minimize visual effects on historic properties. BOEM will also stipulate measures that would be triggered in cases where avoidance of known ancient submerged landforms is not feasible or in cases where there is post-review discovery of previously unknown terrestrial or marine archaeological resources that are not currently found to be adversely affected by the Project. BOEM, with the applicant, will develop and implement one or more historic property treatment plans in consultation with consulting parties that have a demonstrated interest in specific historic properties to address impacts on ancient submerged landforms if they cannot be avoided. Historic property treatment plans will also be prepared to mitigate visual adverse effects and cumulative visual adverse effects.

As part of the NRHP Section 106 process, the applicant has committed to the following measures to avoid, minimize, or mitigate adverse effects, as conditions of approval of the COP:

1. Painting the WTGs no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey in accordance with *Federal Aviation Administration Advisory Circular 70/7460-1M* (Federal Aviation Administration 2020) and BOEM's (2021b) *Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development* to minimize daytime visibility.
2. Installing ADLS to reduce the duration of nighttime lighting. The system would activate aviation warning lights only when an aircraft is in the vicinity of the SWDA, resulting in nighttime visibility of the project from adversely affected historic properties to an estimated less than 13 minutes annually (less than 0.1 percent of annual nighttime hours).
3. Preparing unanticipated discovery plans for both onshore and offshore archaeological resources and human remains.
4. Conducting additional archaeological investigations on unavoidable ancient submerged landforms in the OECC and SWDA.
    a. OECC
        i. Target three distinct types of ancient submerged landforms for investigation:
            1. A preserved fluvial margin terrace withing the nearshore zone (Channel Groups 8 through 15);
            2. A preserved fluvial margin along Muskeget Channel (Channel Groups 16 through 22); and
            3. A preserved kettle/pond lake feature preserved in the offshore portion of the OECC leading into the SWDA (Channel Groups 29 through 30).
        ii. Each location will be tested using closely spaced vibracoring designed to examine these ancient submerged landforms at a higher spatial resolution.
        iii. If either the Western Muskeget Variant or SCV are to be used, any ancient submerged landforms that cannot be avoided will be mitigated following the same methods and protocols as those outlined for the OECC.
    b. SWDA
        i. Vibracore up to 6 meters below the seafloor is recommended to recover sediments related to the stratigraphic units of interest.
        ii. Proposing a combined, broad brush and detailed approach to resolve these adverse effects:
            1. Collecting 1-2 cores at the majority of the submerged, ancient landforms to sample identified horizons; and/or
            2. Collecting a series of closely spaced cores at 2-4 select (not all) ancient submerged landforms based on similar geomorphic characteristics.

   c. All results would be delivered to the consulting tribes (state- and federally recognized), BOEM, Massachusetts Bureau of Underwater Archaeological Resources, Massachusetts Historical Commission, and any other relevant consulting parties in the form of a technical report with supporting digital data files.
   d. Tribal representatives will have the opportunity to be present for all stages of work.
5. Minimizing effects by primarily siting the OECR and grid intersection routes within existing ROWs and below roadways.
6. Conducting archaeological monitoring of construction activities in areas of moderate or high archaeological sensitivity in the Phase 1 terrestrial archaeological APE.
7. Conducting archaeological monitoring of construction activities within the staging areas required for the horizontal direct drilling in the landfall area and during installation of OECR and other components (duct banks, splice vaults) within the identified zone of moderate and high archaeological sensitivity in the Phase 2 terrestrial archaeological APE.

The NHPA Section 106 consultation process is ongoing for the proposed Project and will culminate in an MOA (see Attachment J-1) detailing avoidance, minimization, and mitigation measures to resolve adverse effects on historic properties to which the consulting parties agree. BOEM would continue to consult in good faith with the Massachusetts State Historic Preservation Office and other consulting parties to resolve adverse effects.

## J.5 Phased Identification

Information pertaining to the identification of historic properties associated with the grid interconnection routes, onshore cable routes, landfall locations, and nearshore cable routes for the SCV in Bristol County added to the proposed Project in April 2022, will not be available until after the publication of the Draft EIS. Additional Phase 2 onshore substation parcels may also be identified at a later date. Phased identification and evaluation of historic properties for the remainder of the SCV and any additional Phase 2 onshore substations would be completed at that time, pursuant to 36 CFR § 800.4(b)(2) and in accordance with BOEM's existing *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585*, and ensure potential historic properties are identified, effects assessed, and adverse effects resolved prior to construction. BOEM would conduct Section 106 consultation with the Massachusetts SHPO, ACHP, federally recognized Tribal Nations, and other identified consulting parties. The SCV effects on historic properties would be evaluated in a separate supplemental NEPA analysis.

## J.6 National Historic Landmarks and the National Historic Preservation Act Section 106 Process

The NPS, which administers the NHL program for the Secretary of the Interior, describes NHLs and 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.

NHPA Section 110(f) applies specifically to NHLs. BOEM is fulfilling its responsibilities to give a higher level of consideration to minimizing harm to NHLs by implementing the special set of requirements for protecting NHLs in compliance with NHPA Section 110(f) and 36 CFR § 800.10, which, in summary:

- Require the agency official, to the maximum extent possible, to undertake such planning and actions as may be necessary to minimize harm to any NHL that may be directly and adversely affected by an undertaking;
- Require the agency official to request the participation of ACHP in any consultation conducted under 36 CFR § 800.6 to resolve adverse effects on NHLs; and
- Direct the agency to notify the Secretary of the Interior of any consultation involving an NHL and to invite the Secretary of the Interior to participate in consultation where there may be an adverse effect.

The Historic Resources Visual Effects Assessment (BOEM 2022b) identified one NHL in the visual APE for the proposed Project: the Nantucket Historic District, described in Section J.3.4. BOEM has determined that the proposed Project would result in an adverse effect on the Nantucket Historic District NHL. BOEM is considering for these purposes:

- The magnitude of the undertaking's harm to the historical, archaeological, and cultural qualities of the NHL;
- The public interest in the NHL and in the undertaking as proposed; and
- The effect a mitigation action would have on meeting the goals and objectives of the undertaking (NPS 2013).

BOEM will identify and finalize mitigation measures specific to the NHL in consultation with consulting parties. These measures must be reasonable in cost and not be determined using inflexible criteria, as described by NPS (2013). In addition, mitigation of adverse effects and minimization of harm to the NHL would need to meet the following requirements:

- Reflect the heightened, national importance of the properties and be appropriate in magnitude, extent, nature, and location of the adverse effect;
- Focus on addressing diminished historic resource integrity with outcomes that are in the public interest; and
- 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).

BOEM has already invited the ACHP and NPS NHL staff, under the Secretary of the Interior, to consult on the proposed Project and these parties have accepted. Through consultation, BOEM would continue to consider additional minimization measures, to the maximum extent feasible and require mitigation of adverse effects on the NHL that remain after the application of minimization efforts. BOEM would identify and finalize mitigation measures specific to the NHL with consulting parties through either the development of an MOA and/or as conditions of approval of the Record of Decision under NEPA.

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## ATTACHMENT J-1: MEMORANDUM OF AGREEMENT

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**DRAFT MEMORANDUM OF AGREEMENT**
**AMONG**
**THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,**
**PARK CITY WIND LLC, AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT**

**WHEREAS**, the Bureau of Ocean Energy Management (BOEM) plans to authorize construction and operations of the New England Wind Project (Project) pursuant to Section 8(p)(1)(C) of the Outer Continental Shelf (OCS) Lands Act (43 U.S. Code [USC] § 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 § 30618), and its implementing regulations (36 CFR Part 800), and 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);* and

**WHEREAS,** BOEM plans [to approve, approve with conditions, or disapprove (This clause is subject to change. BOEM will make the final decision by the Final Environmental Impact Statement [EIS] and before the MOA is executed.)] the New England Wind Project Construction and Operations Plan (COP) submitted by Park City Wind LLC (Park City Wind) for construction and installation (construction), operations and maintenance (operations), and conceptual decommissioning (decommissioning) of the Project within Renewable Energy Lease Number (Lease Area) OCS-A 0534 and potentially a portion of the area covered by Lease Area OCS-A 0501 (collectively, the Southern Wind Development Area [SWDA]); and

**WHEREAS,** BOEM determined the construction, operations, and decommissioning of the Project, planned for up to 130 offshore wind turbine generators (WTG), up to 5 electrical service platforms (ESP; also known as offshore substations), up to 3 new or upgraded onshore substations, offshore export cables within an offshore export cable corridor (OECC), and onshore export cables in an onshore export cable route (OECR), could potentially adversely affect historic properties as defined under 36 CFR § 800.16(l)(1); and

**WHEREAS,** Phase 1, also known as the Park City Wind Project, would deliver approximately 804 megawatts through the installation of 41 to 62 WTGs and 1 to 2 ESPs immediately southwest of the Vineyard Wind 1 Project, which is currently under construction. Phase 2, also known as the Commonwealth Wind Project, would deliver at least 1,232 megawatts through the installation of an additional 64 to 88 WTG/ESP positions, immediately southwest of Phase 1. The applicant would install five offshore export cables (two for Phase 1 and three for Phase 2) in an OECC that would transmit the electricity generated by the WTGs to landing sites (one for each phase) in the Town of Barnstable, Massachusetts, and then to OECRs (one for each phase) and one or more substation sites in the Town of Barnstable for interconnection with the regional electrical grid; and

**WHEREAS**, if technical, logistical, or other unforeseen issues prevent export cables from being installed in the proposed OECC, Park City Wind would develop and use the Western Muskeget Variant and/or the South Coast Variant (SCV) for one or more cables (Attachment 1, Area of Potential Effects Maps); and

**WHEREAS**, the SCV would diverge from the OECC and travel west-to-northwest near Buzzards Bay and transmit some or all electricity generated by Phase 2 to a grid interconnection point in Bristol County, Massachusetts, and Park City Wind identified an SCV OECC in federal waters and is developing detailed information about other SCV elements, including the OECC route through state waters and the OECR and substation site in Bristol County; and

**WHEREAS**, BOEM is preparing an EIS for the Project, pursuant to the National Environmental Policy Act (NEPA; 42 USC § 4321 et seq.) 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 Officer (SHPO) of Massachusetts and the Advisory Council on Historic Preservation (ACHP) on June 10, 2021, of its decision to use NEPA substitution and followed the standards for developing environmental documents to comply with Section 106 consultation for this Project pursuant to 36 CFR § 800.8(c), and posted this decision in the *Federal Register* (Fed. Reg.) with BOEM's Notice of Intent to prepare an EIS for the Project on June 30, 2021; and

**WHEREAS,** BOEM, in accordance with 36 CFR § 800.3, invited ACHP to consult on the Project on June 16, 2021, and ACHP accepted on June 18, 2021, and chose to participate in the consultation pursuant to 36 CFR § 800.6(a)(1)(iii); and

**WHEREAS,** BOEM, in accordance with 36 CFR § 800.3, invited the Massachusetts SHPO to consult on the Project on June 11, 2021 and the Massachusetts SHPO accepted on July 8, 2021; 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 NHPA 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 on May 23, 2012.

**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 has defined the undertaking's area of potential effects (APE) 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 renewable energy structures, whether located offshore or onshore, would be visible, constituting the viewshed portion of the APE (viewshed APE); and any temporary or permanent construction or staging areas, both onshore and offshore, which may fall into any of the above portions of the APE (Attachment 1). The APE is further described in Attachment 1; and

**WHEREAS,** BOEM identified 21 aboveground historic properties (including 3 traditional cultural properties [TCP]) in the offshore Project components' portion of the viewshed APE and 7 historic properties in the onshore Project components' portion of the viewshed APE; 6 submerged historic properties and 50 ancient submerged landforms and features (ASLF) in the marine APE; and no historic properties in the terrestrial APE; and

**WHEREAS,** BOEM identified one NHL within the visual APE for offshore development, the Nantucket Historic District; and

**WHEREAS**, within the range of the Project alternatives analyzed in the EIS, BOEM determined 3 aboveground historic properties and one NHL would be subject to visual adverse effects from WTGs, 3 TCPs would be subject to visual and physical adverse effects, no submerged historic properties, and 50 ASLFs may be potentially adversely affected by physical disturbance in the lease area and from export cable construction in the marine APE, and no historic properties in the terrestrial APE would be adversely affected with implementation of the undertaking; and

**WHEREAS**, BOEM determined that the implementation of the avoidance measures identified in the Memorandum of Agreement (MOA) will avoid adverse effects on 14 aboveground historic properties in the offshore viewshed APE, 6 historic properties in the onshore viewshed APE, and 8 submerged historic properties and 2 ASLFs in the marine APE; and

**WHEREAS**, BOEM determined all 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 has determined that the undertaking will have an adverse effect on 49 formerly subaerially exposed ASLFs with the potential to contain pre-Contact period archaeological resources within (Channel Groups 8-30, nonsequential) and outside (SAL06-19, Channel Groups 18, 19, 20, 32, and SCV-OECC-SAL1-17) the boundaries of the Nantucket Sound TCP, the Chappaquiddick Island TCP, and the Vineyard Sound and Moshup's Bridge TCP; and

**WHEREAS,** under each of the Project alternatives analyzed in the EIS, BOEM determined the undertaking would visually adversely affect three TCPs: the Nantucket Sound TCP, the Chappaquiddick Island TCP, and the Vineyard Sound and Moshup's Bridge TCP; and

**WHEREAS,** under each of the Project alternatives analyzed in the EIS, BOEM determined the Project would visually adversely affect four aboveground historic properties including one NHL: the Nantucket Historic District NHL, the Gay Head Lighthouse, the Edwin Vanderhoop Homestead (Aquinnah Cultural Center), which are listed in the NRHP; and the Gay Head Aquinnah Shops Area, which is eligible for listing on the NRHP; and

**WHEREAS,** Park City Wind provided additional information about the SCV, including information on marine and terrestrial archaeology resources along the SCV route in federal waters (i.e., those waters beyond the 3-nautical-mile [3.5-mile] limit from shore), as part of a COP supplemental filing in April 2022 (Epsilon 2022), and information pertaining to identification of historic properties in the portion of the SCV in state waters (i.e., those waters within the 3-nautical-mile limit from shore) or onshore may not be available until after the Record of Decision is issued; and

**WHEREAS**, if Park City Wind chooses to construct the SCV, BOEM would conduct additional analysis of potential effects on historic properties through phased identification; and

**WHEREAS**, BOEM is planning to conduct phased identification for potential effects on historic properties related to additional potential Phase 2 onshore substation locations that are not currently identified in the COP and will be identified before or soon after the COP is approved; and

**WHEREAS**, the Massachusetts SHPO concurred with BOEM's finding of adverse effect on [insert date of SHPO's concurrence]; and

**WHEREAS,** throughout this document the term "tribe," has the same meaning as 'Indian tribe,' as defined at 36 CFR § 800.16(m); and

**WHEREAS,** BOEM invited the following federally recognized tribes to consult on this Project: the Delaware Nation, the Delaware Tribe of Indians, the Mashantucket Pequot Tribal Nation, the Mashpee Wampanoag Tribe of Massachusetts, the Mohegan Tribe of Indians of Connecticut, the Narragansett Indian Tribe, the Shinnecock Indian Nation, and the Wampanoag Tribe of Gay Head (Aquinnah); and

**WHEREAS,** the Mashantucket Pequot Tribe, the Mashpee Wampanoag Tribe of Massachusetts, and the Wampanoag Tribe of Gay Head (Aquinnah) accepted BOEM's invitation to consult, and BOEM invited these tribes to sign the 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 or declining to participate by either written response or no response to direct invitation are listed in Attachment 2, Lists of Invited and Participating Consulting Parties; and

**WHEREAS**, BOEM has consulted with Park City Wind in its capacity as applicant seeking federal approval of its COP, and, because the applicant has responsibilities under the MOA, BOEM has invited the applicant to be an invited signatory to this MOA; and

**WHEREAS**, construction of the Project requires a Department of the Army permit from the U.S. Army Corps of Engineers (USACE) for activities that result in the discharge of dredged or fill material into jurisdictional wetlands and/or other waters of the U.S. pursuant to Section 404 of the Clean Water Act (33 USC § 1344), and activities occurring in or affecting navigable waters of the U.S. pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 USC § 403); and

**WHEREAS,** BOEM invited USACE to consult because USACE will issue permits for the Project under Section 404 of the Clean Water Act (33 USC § 1344) and Section 10 of the Rivers and Harbors Act (33 USC § 403); 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 NHPA Section 106 for this Project (in a letter dated [MONTH, XX, 20XX]), 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; 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 NHPA Section 106 regulations, including consideration of the potential effects on the NHL as required under NHPA Section 110(f) (54 USC § 306107) and 36 CFR § 800.10, the NPS accepted BOEM's invitation to consult on July 7, 2021, and BOEM invited NPS to sign this MOA as a concurring party; and

**WHEREAS,** BOEM has consulted with signatories, invited signatories, and consulting parties participating in the development of this MOA regarding the definition of the undertaking, the delineation of the APEs, the identification and evaluation of historic properties, the assessment of potential effects on the historic properties, and on measures to avoid, minimize, and mitigate adverse effects on historic properties; and

**WHEREAS,** BOEM has planned and is taking action to minimize harm, as required by NHPA Section 110(f) and 36 CFR § 800.10 to the one adversely affected NHL in the viewshed APE, Nantucket Historic District, as explained in BOEM's *Finding of Adverse Effect for the New England Wind Project Construction and Operations Plan* (hereafter, the Finding of Effect, and dated [Month 2023]), with measures including (but not limited to) using non-reflective white and light gray paint on offshore structures and using navigational lighting that minimizes the visibility of the Project from the NHL; and

**WHEREAS**, pursuant to 36 CFR § 800.6, BOEM invited Park City Wind to sign as invited signatory and the consulting parties as listed in Attachment 2 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 dates of this MOA, and consulting parties who choose not to sign this MOA will continue to receive information if requested and will have an opportunity to participate in consultation as specified in this MOA; and

**WHEREAS**, signatories and invited 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 view of the public regarding NHPA 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 July 19, 23, and 26, 2021, and virtual public hearings related to the Draft EIS on [Month XX, Year]; and

**WHEREAS**, BOEM made the first Draft MOA available to the public for review and comment from [Month XX, Year], to [Month XX, Year], using BOEM's Project website, and BOEM [did or did not receive any comments from the public]; and

**NOW, THEREFORE**, BOEM, the Massachusetts SHPO, and the ACHP agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the adverse effects of the undertaking on historic properties and resolve those adverse effects, pursuant to 36 CFR § 800.6(c).

## STIPULATIONS

BOEM, with the assistance of Park City Wind, shall ensure that the following measures are carried out as conditions of its approval of the undertaking:

### I. MEASURES TO AVOID ADVERSE EFFECTS ON IDENTIFIED HISTORIC PROPERTIES

A. Marine APE

1. BOEM will include the following measures to avoid adverse effects within the marine APE as conditions of approval of the New England Wind COP Attachment 3, Historic Property Treatment Plan for Submerged Historical Properties:

   i. Park City Wind will avoid known shipwrecks identified during marine archaeological surveys 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.

   ii. Park City Wind will avoid potential shipwrecks and potentially significant debris fields previously identified during marine archaeological surveys by a distance of no less than 164 feet (50 meters) from the known extent of the resource for placement of proposed Project structures and when conducting seafloor-disturbing activities.

   iii. Park City Wind will avoid two ASLFs previously identified during marine archaeological resource assessments for the proposed 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.

B. Visual APE

1. BOEM will include the following measure to avoid adverse effect within the viewshed APE as a condition of approval of the New England Wind COP:

   i. To maintain avoidance of adverse effects on historic properties in the viewshed APE where BOEM determined no adverse effects or where no effects would occur, BOEM will require Park City Wind to ensure Project structures are within the Project design envelope (PDE), sizes, scale, locations, lighting prescription, and distances that were used to inform the definition of APE for the Project and for determining effects in the Finding of Effect (see the New England Wind Project COP).

### II. MEASURES TO MINIMIZE ADVERSE EFFECTS ON IDENTIFIED HISTORIC PROPERTIES

A. Visual APE

1. BOEM has undertaken planning and actions to minimize adverse effects on aboveground historic properties in the visual APE. BOEM will include the following measures to minimize adverse effects within the visual APE as conditions of the approval of the New England Wind COP:

   i. Park City Wind will use uniform WTG design, speed, height, and rotor diameter to reduce visual contrast and decrease visual clutter.

ii. Park City Wind will use uniform WTG spacing of 1 nautical mile (1.15 mile) by 1 nautical mile (1.15 mile) in the north-to-south and east-to-west direction to decrease visual clutter.

iii. Park City Wind will paint the WTGs no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey in accordance with Federal Aviation Administration Advisory Circular 70/7460-1M (2020) and BOEM's *Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development* (2021) to minimize daytime visibility.

iv. Park City Wind will equip all WTGs and ESPs with an aircraft detection lighting system to reduce the duration of nighttime lighting. The system will activate aviation warning lights only when an aircraft is in the vicinity of the SWDA, resulting in nighttime visibility of the Project from adversely affected historic properties to an estimated less than 13 minutes annually (less than 0.1 percent of annual nighttime hours).

B. Terrestrial APE

1. BOEM has undertaken planning and actions to minimize adverse effects on historic properties in the terrestrial APE. BOEM will include the following measures to minimize adverse effects within the terrestrial APE as conditions of the approval of the New England Wind COP:

i. Park City Wind will minimize adverse effects by primarily siting the OECR and grid interconnection cable routes within existing roadway and/or public utility rights-of-way.

2. Park City Wind will conduct archaeological monitoring of construction activities in the areas of moderate or high archaeological sensitivity in the Phase 1 terrestrial archaeological APE.

3. Park City Wind will conduct archaeological monitoring of construction activities within the staging areas required for the horizontal directional drilling in the landfall area and during installation of OECR and other components (duct banks, splice vaults) within the identified zone of moderate and high archaeological sensitivity in the Phase 2 terrestrial archaeological APE.

## III. MEASURES TO MITIGATE ADVERSE EFFECTS ON IDENTIFIED HISTORIC PROPERTIES

A. Marine APE

1. Park City Wind will be unable to avoid 49 ASLFs: SAL-04 through SAL-20 in SWDA, Channel Groups 8-32 (non-sequential) in the OECC, Channel Groups 18, 19, 20 in the Western Muskeget Variant, and SCV-OECC-SAL1 through SCV-OECC-SAL17 in the SCV. To mitigate adverse effects on the ASLFs, BOEM will include the following as conditions of approval of the New England Wind COP and require fulfillment of the following as mitigation measures prior to construction. Park City Wind will fund mitigation measures in accordance with Attachment 4, Historic Property Treatment Plan for Ancient Submerged Landforms and Features:

i. Pre-construction Geoarcheaology: Park City Wind will fulfill commitments for additional archaeological investigations of unavoidable

ASLFs to better ascertain their chronological setting, archaeological period association, environmental setting, and evidence of human habitation, including acquiring additional vibracores within the upper 19 feet (6 meters) of the seabed.

ii. Post-construction Seafloor Assessment: Park City Wind will fulfill commitments for post-construction seafloor assessment via visual inspection survey of up to three impacted, high-potential ASLFs where ground disturbance occurred.

iii. Tribal Focused Mitigation: Park City Wind will fulfill commitments to mitigation supporting tribal objectives, including a detailed presentation generated to describe the scientific methods and processes undertaken as part of the offshore preconstruction surveys and archaeological assessment to document the buried and ASLFs in Nantucket Sound; a digital database of ASLF data analysis and mapping; a workshop for each tribe on use of geographic information system (GIS) software; and option for in-person presentation on ASLF study results to tribal representatives and community.

B. Visual APE

1. BOEM will include the following as conditions of approval of the New England Wind COP and as mitigation measures to resolve the adverse effects on the following historic properties that will be visually adversely affected: Gay Head Lighthouse; Edwin Vanderhoop Homestead (Aquinnah Cultural Center); Gay Head-Aquinnah Shops Area; Chappaquiddick Island TCP, Moshup's Bridge and Vineyard Sound TCP, and Nantucket Sound TCP. Additional details regarding treatment measures can be found in Attachments 5 through 9.

i. Park City Wind will fund fulfillment of mitigation measures prior to construction in accordance with Attachment 5, Historic Property Treatment Plan for the Edwin Vanderhoop Homestead and Gay Head – Aquinnah Shops Area:

a. Vineyard Sound and Moshup's Bridge TCP Mitigation: Park City will fulfill commitments to public education, scholarships and training for tribal resource and/or environmental stewardship, and coastal resilience and habitat restoration described in the Historic Property Treatment Plan for Vineyard Sound and Moshup's Bridge TCP,

b. NRHP Nomination of Gay Head-Aquinnah Shops: Park City Wind will fulfill commitments to draft a NRHP nomination for the Gay Head-Aquinnah Shops Area.

ii. Park City Wind will fund fulfillment of mitigation measures prior to construction in accordance with Attachment 6, Historic Property Treatment Plan for [REDACTED] TCP:

a. Survey and GIS Database of Contributing Resources to TCP: Park City Wind will fulfill commitments to conduct a photographic survey of up to 20 contributing sites and/or features to the TCP and develop a GIS database of contributing resources.

b. Development of Interpretive Materials: Park City Wind will fulfill commitments to develop and incorporate digital media and interpretive materials, including ArcGIS story maps or other presentations, in conjunction with the GIS database.

iii. Park City Wind will fund fulfillment of mitigation measures prior to construction in accordance with Attachment 7, Historic Property Treatment Plan for Gay Head Lighthouse:

a. Ongoing Maintenance: Park City Wind will fulfill commitments to fund assist with ongoing repairs and maintenance of Gay Head Lighthouse, including painting, annual maintenance of grounds and turf, repairs and maintenance to pathways for public circulation, including an existing Americans with Disabilities Act-compliant pathway, and other minor repairs.

iv. Park City Wind will fund fulfillment of mitigation measures prior to construction in accordance with Attachment 8, Historic Property Treatment Plan for [REDACTED] TCP:

a. Public Education: Park City Wind will fulfill commitments to fund the development of public education materials related to Moshup and Moshup's Bridge.

b. Scholarships and Training for Tribal Resource and/or Environmental Stewardship: Park City Wind will fulfill commitments to fund scholarships and fees for professional training or certification in fields related to the TCP, including, but are not limited to, anthropology, archaeology, astronomy, aquaculture, biology, ethnohistory, history, marine construction/ fisheries/ sciences, or Native American studies.

c. Coastal Resilience and Habitat Restoration: Park City Wind will fulfill commitments to fund future planning and development of efforts to help mitigate negative impacts of climate change.

v. Park City Wind will fund fulfillment of mitigation measures prior to construction in accordance with Attachment 9, Historic Property Treatment Plan for [REDACTED] TCP:

a. Nineteen of the adversely affected ASLFs in the Project OECC and Western Muskeget Variant are potential contributors to the Nantucket Sound TCP. Park City Wind will fulfill commitments to additional archaeological investigation described in the Historic Property Treatment Plan for Ancient Submerged Landforms and Features.

## IV. PHASED IDENTIFICATION

A. BOEM will implement the following consultation steps for phased identification of historic properties in accordance with BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to Title 30 Code of Federal Regulations Part 585*. The final identification of historic properties related to the SCV or Phase 2 onshore substations may occur after publication of the Draft EIS, but prior to the initiation of construction. BOEM will conduct phased identification of historic properties, pursuant to 36 CFR § 800.4(b)(2) and following the steps below.

1. BOEM, with the assistance of Park City Wind, will invite any additional consulting parties that may want to consult on this phased identification based on any new information regarding the specific locations of the SCV or Phase 2 onshore substations.
2. For identification of historic properties within the marine, terrestrial, and viewshed potions of the APE, supplemental technical studies will be conducted by Park City Wind in accordance with Massachusetts SHPO guidelines and recommendations in BOEM's most recent *Guidelines.* Park City Wind will coordinate with the SHPO prior to the initiation of any such identification efforts.
    - i. BOEM will delineate the marine, terrestrial, and visual portions of the APE for the SCV.
    - ii. BOEM will delineate the terrestrial and visual portions of the APE for the Phase 2 onshore substations.
    - iii. BOEM will require that identification efforts for historic properties associated with marine archaeology, terrestrial archaeology, and above-ground resources be documented in technical reports that address the identification of historic properties and include an evaluation of effects due to the Project.
3. BOEM will consult on the results of historic property identification that were not addressed in the pre-COP approval consultations.
4. BOEM will treat all identified potential historic properties as eligible for inclusion in the NRHP unless BOEM determines, and the SHPO agrees, that a property is ineligible, pursuant to 36 CFR § 800.4(c).
5. If BOEM identifies no additional historic properties or determines that no historic properties are adversely affected, BOEM, with the assistance of Park City Wind, will notify and consult with the signatories, invited signatories, and consulting parties following the consultation process set forth here in this stipulation.
    - i. Park City Wind will notify all the signatories, invited signatories, and consulting parties about the selection of the SCV or Phase 2 onshore substations and BOEM's determination by providing a written summary including any maps, a summary of the surveys and/or research conducted to identify historic properties and assess effects, and copies of the surveys.
    - ii. The signatories, invited signatories, and consulting parties will have 30 calendar days to review and comment on the survey reports, the results of the surveys, BOEM's determination, and the documents.
    - iii. After the 30-calendar review period has concluded and if no comments require additional consultation, Park City Wind will notify the signatories and consulting parties that the Massachusetts SHPO has

concurred with BOEM's determination. If comments are received, Park City Wind will provide to signatories, invited signatories, and consulting parties a summary of the comments and BOEM's responses.

iv. BOEM, with the assistance of Park City Wing, 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 determined to be adversely affected.

6. If BOEM determines new adverse effects to historic properties will occur, BOEM, with the assistance of Park City 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.

   i. Park City Wind will notify all signatories, invited signatories, and consulting parties about the selected SCV or Phase 2 onshore substations and BOEM's determination by providing a written summary including any maps, a summary of the surveys and/or research conducted to identify historic properties and assess effects, copies of the surveys, 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 documents including the adverse effect finding and the proposed resolution of adverse effect(s), including a draft treatment plan(s).

   iii. BOEM, with the assistance of Park City 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 Park City Wind, will respond to the comments and make necessary edits to the documents.

   v. Park City 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, Park City Wind will provide a summary of all the comments received on the documents and BOEM's responses.

   vi. BOEM, with the assistance of Park City Wind, will respond to the comments on the draft final documents and make necessary edits to the documents.

   vii. After BOEM has received concurrence from the Massachusetts SHPO on the finding of new adverse effect(s) and BOEM has accepted the final treatment plan(s), Park City Wind will provide all the signatories, invited signatories, and consulting parties with the final document(s) including the final treatment plan(s), a summary of comments, and BOEM's responses to comments, if any are received on the draft final documents.

   viii. The MOA will not need to be amended after the treatment plan(s) is accepted by BOEM.

7. If a SHPO disagrees with BOEM's determination regarding whether an affected property is eligible for inclusion in the NRHP, or if the ACHP or the Secretary of the Interior so request, the agency official will obtain a determination of eligibility from the Secretary pursuant to 36 CFR Part 63 (36 CFR § 800.4(c)(2)).

Additional information on the phased identification plan can be found in Attachment 10, New England Wind Phased Identification Plan.

## V. REVIEW PROCESS FOR DOCUMENTS

A. The following process will be used for any document, report, or plan produced in accordance with Stipulations of this MOA:

1. Draft Document
    i. Park City 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 Park City Wind, who will have 15 calendar days to address the comments.
        c. After review and approval of the document by BOEM, BOEM, with the assistance of Park City Wind, shall provide the draft document to the consulting parties, except the ACHP, for review and comment.
        d. Consulting parties shall have 30 calendar days to review and comment.
        e. BOEM, with the assistance of Park City Wind, shall coordinate a meeting with consulting parties to facilitate comments on the document if requested by a consulting party.
        f. BOEM shall consolidate comments received and provide them to Park City Wind within 15 calendar days of receiving comments from consulting parties.
        g. BOEM, with the assistance of Park City Wind, will respond to the comments and make necessary edits to the documents.
2. Draft Final Document
    i. Park City 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 Park City Wind, who will have 15 calendar days to address the comments.

ii. BOEM, with the assistance of Park City Wind, shall provide the final 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 Park City 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 Park City Wind within 15 calendar days of receiving comments from consulting parties.

d. BOEM, with the assistance of Park City Wind, will respond to the comments and make necessary edits to the documents.

3. Final Document

i. Park City 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, BOEM shall submit its comments back to Park City Wind, who will have 15 calendar days to address the comments.

c. BOEM, with the assistance of Park City Wind, shall provide the final document to consulting parties, except the ACHP, within 30 calendar days of approving the final document. With this same submittal of final documents, Park City Wind will provide a summary of all the comments received on the documents and BOEM's responses.

## VI. PROJECT MODIFICATIONS

A. If Park City Wind proposes any modifications to the Project that expand the Project beyond the PDE included in the COP and/or outside the defined APEs, or if the proposed modifications change BOEM's final Section 106 determinations and findings for this Project, Park City Wind will 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, Park City Wind will provide the signatories, invited signatories, and consulting parties with the information concerning the proposed changes, and the signatories, invited signatories, and consulting parties will have 30 calendar days from receipt of this information to comment on the proposed changes. BOEM will 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 no historic properties are adversely affected due to the modification, BOEM, with the assistance of Park City Wind, will notify and consult with the signatories, invited signatories, and consulting parties following the consultation process set forth in this Stipulation VI.A.1.
   i. Park City Wind will notify all 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. The signatories, invited signatories, and consulting parties will have 30 calendar days to review and comment on the proposed change, BOEM's determinations, and the documents.
   iii. After the 30-day calendar review period has concluded and no comments require additional consultation, Park City 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 Park City 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 or adversely affected.
2. If BOEM determines new adverse effects on historic properties will occur due to a Project modification, BOEM, with the assistance of Park City Wind, will notify and consult with the relevant 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 VI.A.2.
   i. Park City 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 Park City Wind, will conduct additional consultation meetings, if necessary, during consultation on the adverse effect finding and during drafting and finalization of the treatment plans(s).
   iv. BOEM, with the assistance of Park City Wind, will respond to comments and make necessary edits to the documents.

v. Park City 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 the submittal of draft final documents, Park City Wind will provide a summary of all the comments received on the documents and BOEM's responses.

vi. BOEM, with the assistance of Park City Wind, will respond to the comments on the draft final documents and make necessary edits to the documents.

vii. 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. Park City Wind will notify all 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. 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 VI.A.1 and VI.A.2), BOEM will resolve any such objections pursuant to the dispute resolution process set forth in Stipulation XI, Amendments.

## VII. SUBMISSION OF DOCUMENTS

A. ACHP, NPS, tribes, and consulting parties

1. All submittals to ACHP, NPS, tribes, and consulting parties will be submitted electronically unless a specific request is made for the submittal to be provided in paper format.

B. Massachusetts SHPO

1. All submittals to Massachusetts SHPO will be in paper format and delivered by U.S. mail, delivery service, or by hand.

2. Plans and specifications submitted to Massachusetts SHPO must measure no larger than 11- by 17-inch 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.

## VIII. 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 may 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 Massachusetts SHPO, or an approved and certified repository, in accordance with the standards and guidelines required by the Massachusetts SHPO. Lands as described here may include the seafloor in state waters. No excavation may 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 landowner. In such instances, BOEM and Park City Wind, in coordination with the SHPO and affected Tribe(s), will encourage landowners 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, Park City Wind will seek to have the materials donated to the repository identified under Stipulation VIII.B\.1 through a written donation agreement developed in consultation with the consulting parties. BOEM, assisted by Park City 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 Park City Wind will ensure that recovered artifacts and related documentation are curated in a suitable repository as agreed to by BOEM, Massachusetts 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 may be initiated before acceptance and approval of a curation plan.

## IX. PROFESSIONAL QUALIFICATIONS

A. SOI Standards for Archaeology and Historic Preservation. Park City Wind will ensure all work carried out pursuant to this MOA meets the *Secretary of the Interior's Standards for Archaeology and Historic Preservation* (48 Fed. Reg. 44716, September 29, 1983), taking into account the suggested approaches to new construction in the Standards for Rehabilitation.

B. SOI Professional Qualification Standards. Park City Wind will ensure that all work carried out pursuant to this MOA is performed by or under the direct supervision of historic preservation professionals who meet the *Secretary of the Interior's Professional Qualifications Standards* (48 Fed. Reg. 44738–44739). A "qualified professional" is a person who meets the relevant standards outlined in such SOI's standards. BOEM, or its designee, will ensure that consultants retained for services pursuant to the MOA meet these standards.

C. Tribal Consultation Experience. Park City Wind will ensure that all work carried out pursuant to this MOA that requires consultation with tribes is performed by professionals who have demonstrated professional experience consulting with federally recognized tribes.

D. Investigations of ASLFs. Park City 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 *Secretary of the*

*Interior's Professional Qualifications Standards*, with 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.

## X. DURATION

A. This MOA will expire at (1) the decommissioning of the Project in the lease area, as defined in Park City Wind's lease with BOEM (Lease Number OCS-A 0534) or (2) 30 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 Stipulation XI.

## XI. 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 will implement the post-review discovery plans found in Attachment 11, New England Wind Terrestrial Unanticipated Discovery Plan, and Attachment 12, New England Wind Unanticipated Discoveries Plan for Submerged Archaeological Resources.

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 on a historic property prior to or during construction, operations, or decommissioning of the Project, Park City 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;
2. If on-site archaeological investigations are required, as determined by the applicant's cultural resources consultants, notify BOEM of the discovery and conduct investigations;
3. Keep the location of the discovery confidential and take no action that may adversely affect the discovered property until the applicant's cultural resources consultant conducts a review of the discovery site and determines how to proceed;
4. Conduct any additional investigations to determine if the resource is eligible for listing in the NRHP (30 CFR § 585.802[b]) and consult with SHPO. BOEM will also be notified about the transmittal of information on the archaeological site to SHPO.
5. If investigations indicate that the resource is eligible for the NRHP, BOEM, with the assistance of Park City 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, Park City Wind will contact the tribes 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 tribes pursuant to the post-review discovery plan.

## XII. 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, Park City 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 will include a description of how the stipulations relating to avoidance and minimization measures (Stipulations I and II) 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. Park City 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.

## XIII. DISPUTE RESOLUTION

A. Should any signatory to this MOA object to any actions proposed or the manner in which the terms of this MOA are implemented, it must notify BOEM in writing of its objection. BOEM shall consult with such party to resolve the objection.

   1. If BOEM determines that such objection cannot be resolved, BOEM will forward all documentation relevant to the dispute, including BOEM's proposed resolution, to the ACHP. The ACHP will provide BOEM 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 will 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 the written response. BOEM will then make its 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 will prepare a written response that takes into account any timely comments regarding the dispute from the signatories, invited signatories, and/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 will review the objection and may notify the other signatories as appropriate and respond to the objector.

## XIV. 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, 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.

## 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 Stipulation XI.

B. Should the signatories and invited signatories approve the federal agency's request to be a signing party to this MOA, an amendment under this stipulation 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

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.

Execution of this MOA by BOEM, the Massachusetts SHPO, 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 on resolution of effects of this undertaking on historic properties.

## XVII. TERMINATION

If any signatory or invited signatory to this MOA determines that its terms will not or cannot be carried out, that party will 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.

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 will notify the signatories and invited signatories as to the course of action it will pursue.

[SIGNATURES COMMENCE ON FOLLOWING PAGE]

**MEMORANDUM OF AGREEMENT**
**AMONG**
**THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,**
**PARK CITY WIND LLC, AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT**

Signatory:

Bureau of Ocean Energy Management (BOEM)

________________________________________ Date: _________________

Amanda Lefton

Director

Bureau of Ocean Energy Management

**MEMORANDUM OF AGREEMENT**
**AMONG**
**THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,**
**PARK CITY WIND LLC, AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT**

Signatory:

Massachusetts State Historic Preservation Officer (SHPO)

_____________________________________________ Date: __________________

Brona Simon, State Historic Preservation Officer

**MEMORANDUM OF AGREEMENT**
**AMONG**
**THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,**
**PARK CITY WIND LLC, AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT**

Signatory:

Advisory Council on Historic Preservation (ACHP)

________________________________________ Date: _________________

Reid J. Nelson

Executive Director, Acting

Advisory Council on Historic Preservation

**MEMORANDUM OF AGREEMENT
AMONG
THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
PARK CITY WIND LLC, AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT**

Invited Signatory:

Park City Wind LLC

________________________________________ Date: ________________

[Name]

[Title]

[Affiliation]

**MEMORANDUM OF AGREEMENT**
**AMONG**
**THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,**
**PARK CITY WIND LLC, AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT**

Concurring Party:

United States Army Corps of Engineers (USACE)

_____________________________________________ Date: __________________

[Name]

[Title]

[Affiliation]

**MEMORANDUM OF AGREEMENT**
**AMONG**
**THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,**
**PARK CITY WIND LLC, AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT**

Concurring Party:

Mashantucket Pequot Tribal Nation

_____________________________________________ Date: __________________

[Name]

[Title]

Mashantucket Pequot Tribal Nation

**MEMORANDUM OF AGREEMENT**
**AMONG**
**THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,**
**PARK CITY WIND LLC, AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT**

Concurring Party:

Mashpee Wampanoag Tribe of Massachusetts

____________________________________________ Date: __________________

[Name]

[Title]

Mashpee Wampanoag Tribe of Massachusetts

**MEMORANDUM OF AGREEMENT**
**AMONG**
**THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,**
**PARK CITY WIND LLC, AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT**

Concurring Party:

Wampanoag Tribe of Gay Head (Aquinnah)

__________________________________________ Date: _________________

[Name]

[Title]

Wampanoag Tribe of Gay Head (Aquinnah)

**MEMORANDUM OF AGREEMENT**
**AMONG**
**THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,**
**PARK CITY WIND LLC, AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT**

## LIST OF ATTACHMENTS TO THE MOA

ATTACHMENT 1 – AREA OF POTENTIAL EFFECTS MAPS

ATTACHMENT 2 – LISTS OF INVITED AND PARTICIPATING CONSULTING PARTIES

ATTACHMENT 3 – HISTORIC PROPERTY TREATMENT PLAN FOR SUBMERGED HISTORICAL PROPERTIES

ATTACHMENT 4 – HISTORIC PROPERTY TREATMENT PLAN FOR ANCIENT SUBMERGED LANDFORMS AND FEATURES

ATTACHMENT 5 – HISTORIC PROPERTY TREATMENT PLAN FOR THE EDWIN VANDERHOOP HOMESTEAD AND GAY HEAD – AQUINNAH SHOPS AREA

ATTACHMENT 6 – HISTORIC PROPERTY TREATMENT PLAN FOR [REDACTED] TCP

ATTACHMENT 7 – HISTORIC PROPERTY TREATMENT PLAN FOR GAY HEAD LIGHTHOUSE

ATTACHMENT 8 – HISTORIC PROPERTY TREATMENT PLAN FOR [REDACTED] TCP

ATTACHMENT 9 – HISTORIC PROPERTY TREATMENT PLAN FOR [REDACTED] TCP

ATTACHMENT 10 – NEW ENGLAND WIND PHASED IDENTIFICATION PLAN

ATTACHMENT 11 – NEW ENGLAND WIND TERRESTRIAL UNANTICIPATED DISCOVERY PLAN

ATTACHMENT 12 – NEW ENGLAND WIND UNANTICIPATED DISCOVERIES PLAN FOR SUBMERGED ARCHAEOLOGICAL RESOURCES

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ATTACHMENT 1 – AREA OF POTENTIAL EFFECTS MAPS

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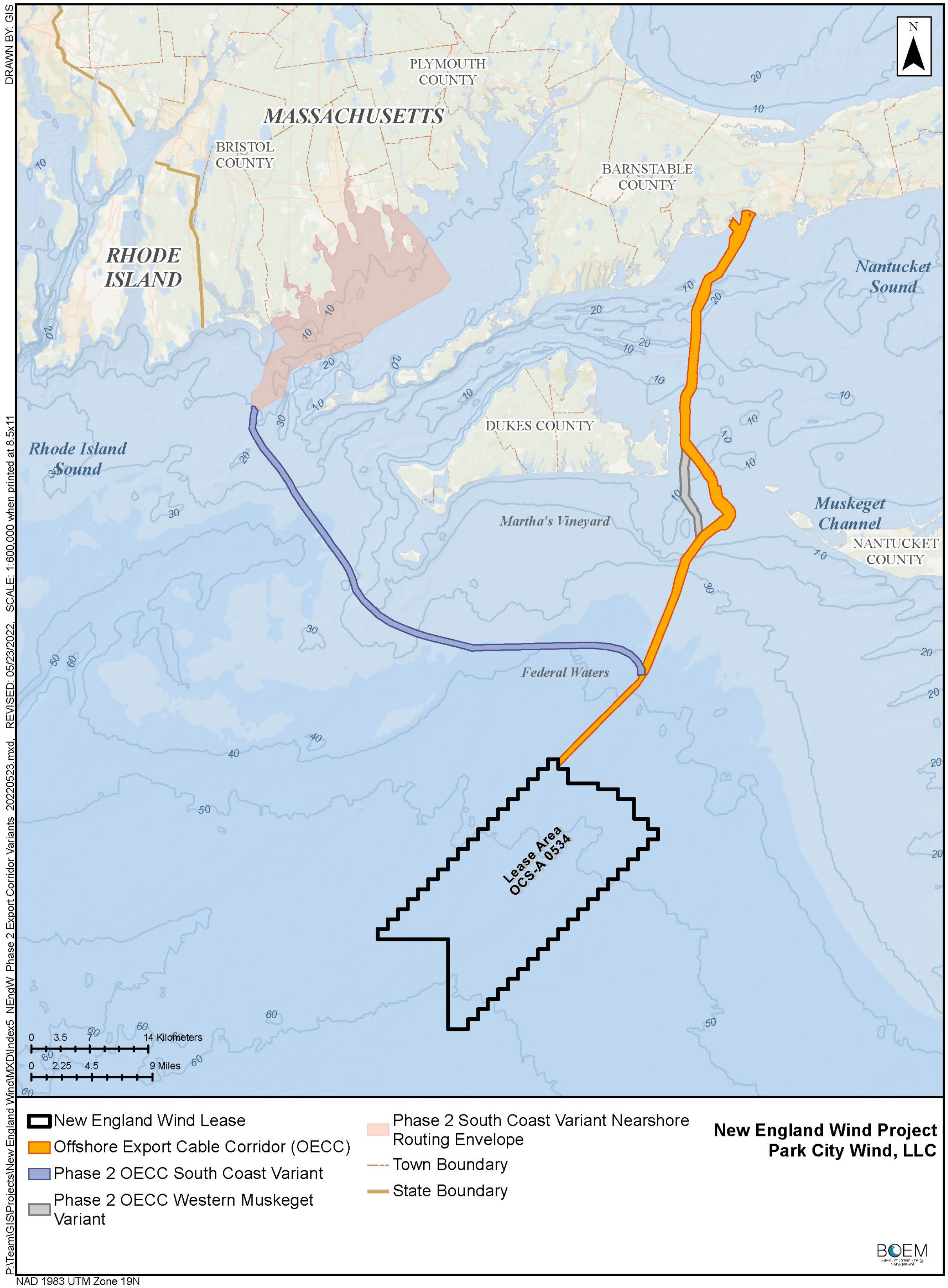
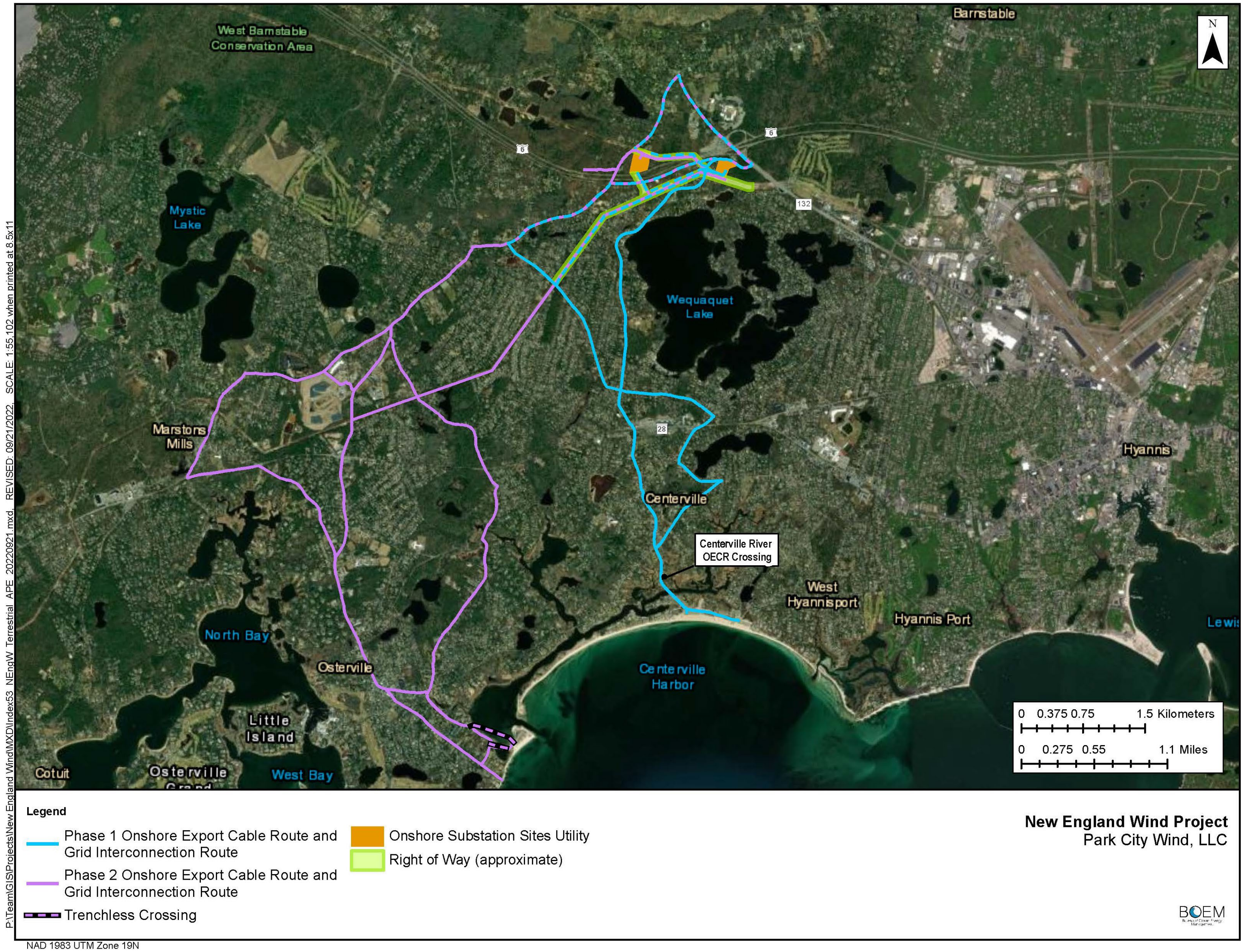
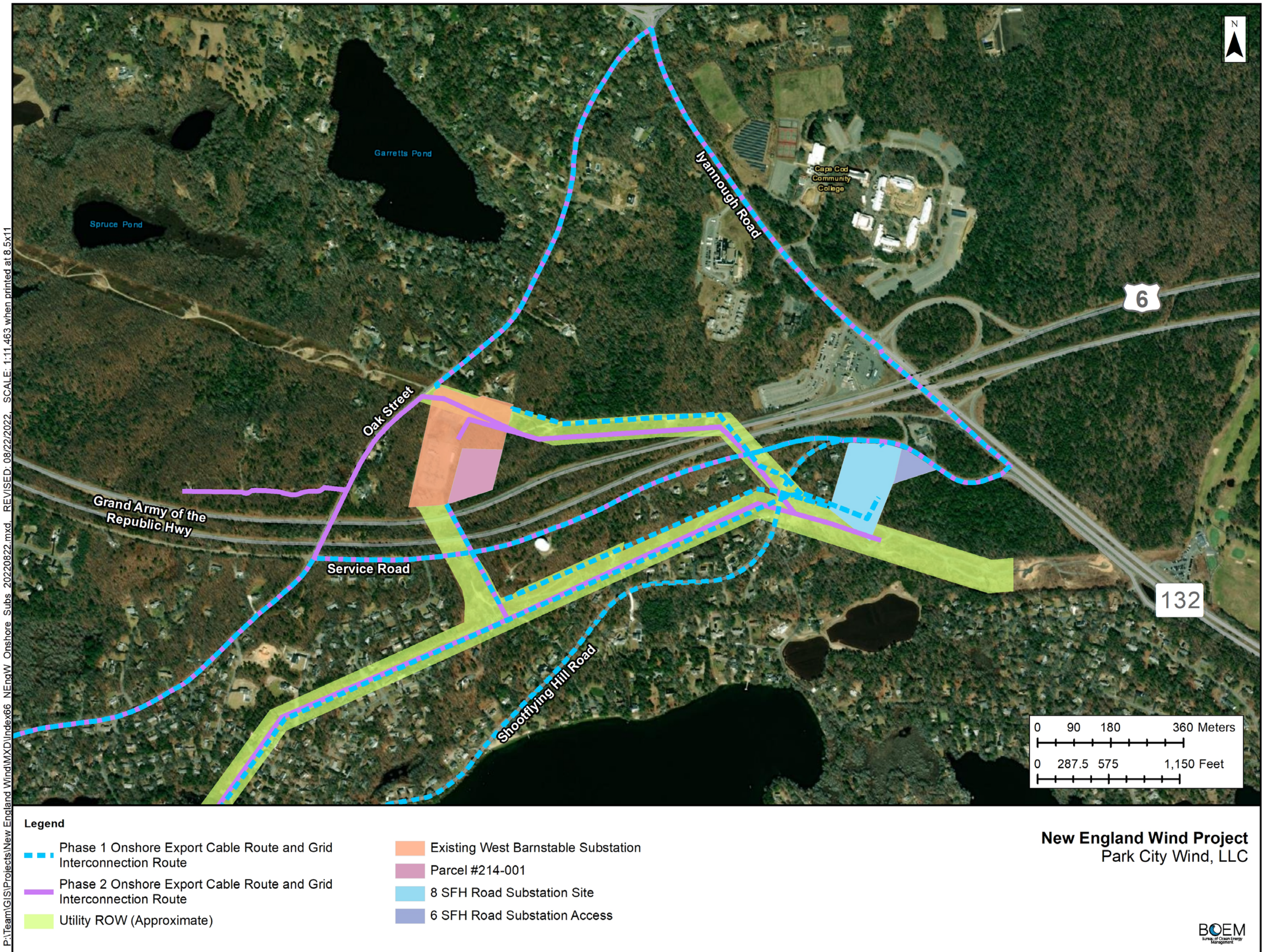



**Marine Area of Potential Effects**




**Terrestrial Area of Potential Effects**

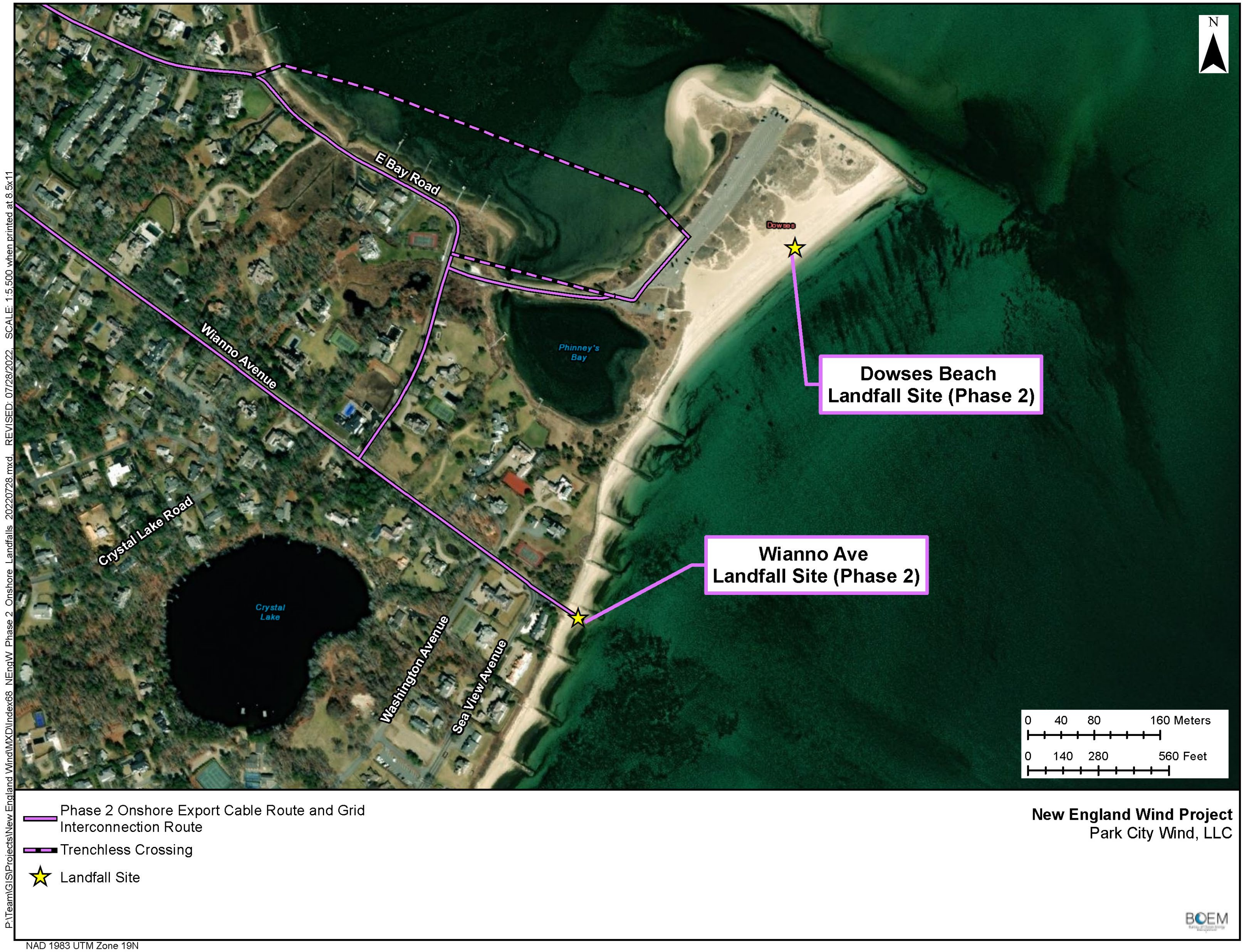

**Terrestrial Area of Potential Effects, Phase 1 Landfall Sites**



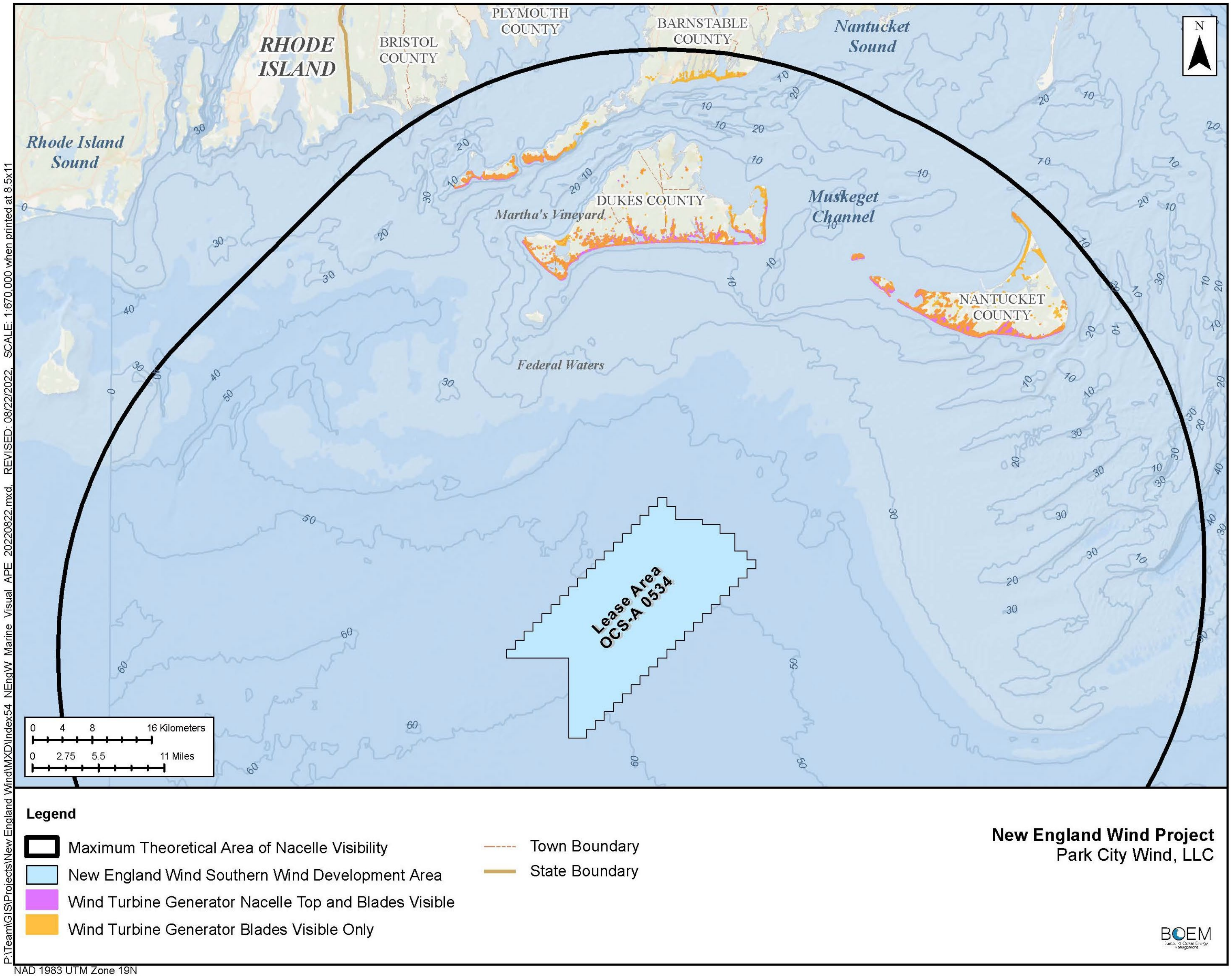

NAD 1983 UTM Zone 19N

ROW = right-of-way; SFH = Shootflying Hill

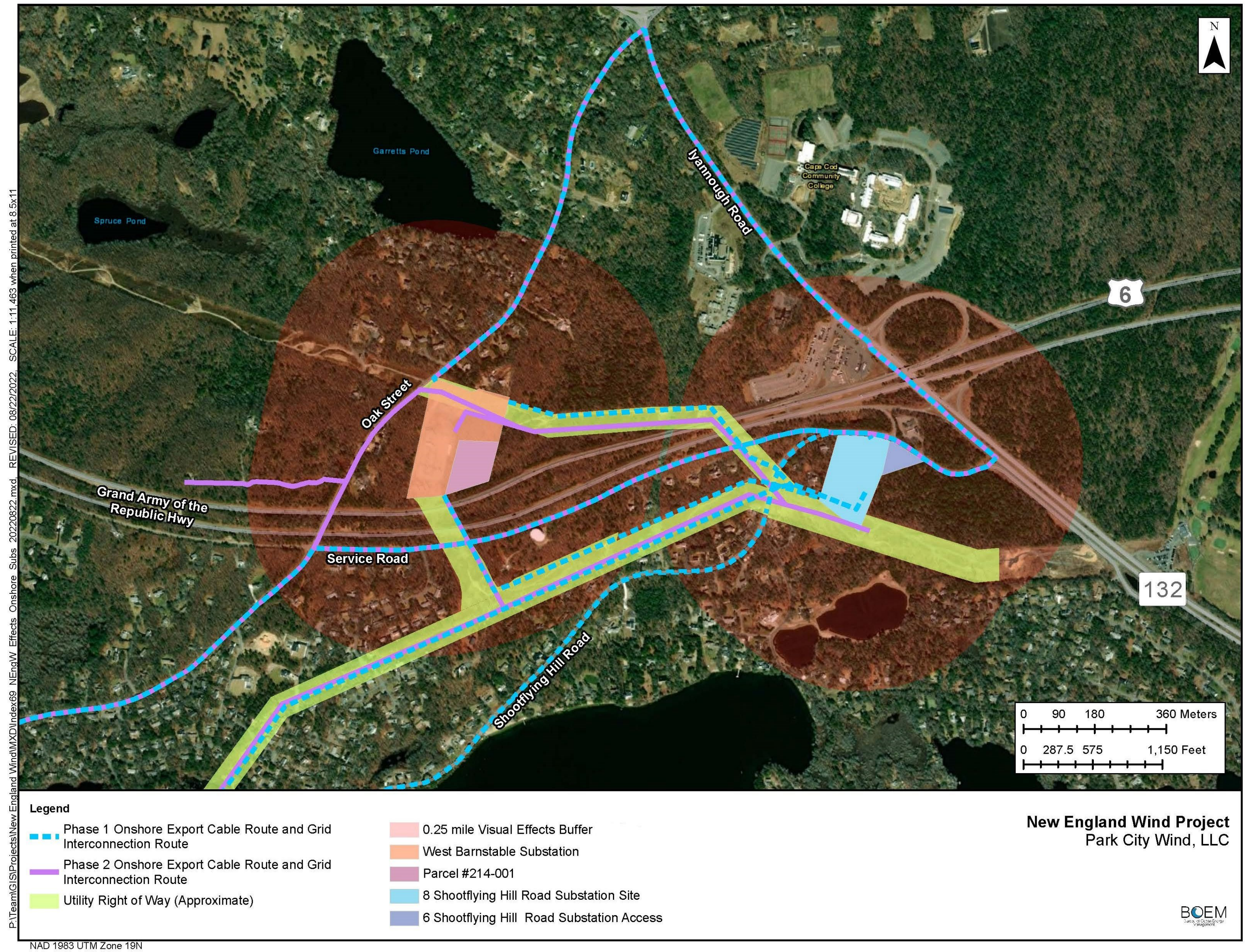
**Terrestrial Area of Potential Effects, West Barnstable Substation Area**




**Terrestrial Area of Potential Effects, Phase 2 Landfall Sites**




**Offshore Visual Area of Potential Effects**




**Onshore Visual Area of Potential Effects, Barnstable Substation Sites**


**Onshore Visual Area of Potential Effects, Centerville River Bridge**

## Attachment 2-1: Entities Invited to be Consulting Parties

The following is a list of governments and organizations that BOEM contacted and invited to be a consulting party to the NHPA Section 106 review of the New England Wind Project (formerly Vineyard Wind South) between June 2021 and April 2022. During the consultations, additional parties were made known to BOEM and were added as they were identified. All counties and municipalities listed below are in Massachusetts unless otherwise specified.

- Advisory Council on Historic Preservation (ACHP)
- Alliance to Protect Nantucket Sound
- Avangrid
- Bureau of Safety and Environmental Enforcement
- Cape Cod Commission
- Non-federally recognized historic Massachusetts Chappaquiddick Tribe of the Wampanoag Nation
- City of New Bedford
- City of Fall River
- Connecticut Department of Economic and Community Development, State Historic Preservation Office
- County of Barnstable
- County of Bristol
- County of Dukes
- Cultural Heritage Partners
- The Delaware Nation
- Delaware Tribe of Indians
- Gay Head Lighthouse Advisory Board
- Historic District Commission (Nantucket)
- Maria Mitchell Association (Dark Skies Initiative)
- Martha’s Vineyard Commission
- Mashantucket (Western) Pequot Tribal Nation
- Mashpee Wampanoag Tribe of Massachusetts
- Massachusetts Board of Underwater Archaeological Resources
- Massachusetts Commission on Indian Affairs
- Massachusetts Historical Commission
- Mohegan Tribe of Indians of Connecticut
- Nantucket Conservation Foundation
- Nantucket Historical Association
- Nantucket Historical Commission
- Nantucket Planning Commission
- Nantucket Preservation Trust
- Narragansett Indian Tribe
- National Oceanic and Atmospheric Administration, Habitat and Ecosystem Services Division
- National Park Service
- Office of the Deputy Assistant Secretary of the Navy for Environment
- Preservation Massachusetts
- Rhode Island Historical Preservation & Heritage Commission
- The Shinnecock Indian Nation
- Town of Aquinnah
- Town of Barnstable
- Town of Barnstable Historical Commission
- Town of Chilmark
- Town of Dartmouth
- Town of Dighton
- Town of Edgartown
- Town of Fairhaven

- Town of Falmouth
- Town of Gosnold
- Town of Nantucket
- Town of Oak Bluffs
- Town of Tisbury
- Town of West Tisbury
- Town and County of Nantucket (via their counsel)
- Trustees, Martha’s Vineyard and Nantucket
- U.S. Environmental Protection Agency
- U.S. Federal Aviation Administration
- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers
- U.S. Coast Guard
- U.S. Department of Defense
- Vineyard Power Cooperative
- Vineyard Wind
- Wampanoag Tribe of Gay Head (Aquinnah)

## Attachment 2-2: Consulting Parties to the New England Wind Project

The following is a current list of consulting parties to the NHPA Section 106 review of the New England Wind Project, as of April 22, 2022.

- Advisory Council on Historic Preservation (ACHP)
- Alliance to Protect Nantucket Sound
- Bureau of Safety and Environmental Enforcement
- Cape Cod Commission
- County of Dukes
- County of Bristol
- Gay Head Lighthouse Advisory Board
- Maria Mitchell Association (Dark Skies Initiative) (withdrew August 27, 2020)
- Martha's Vineyard Commission
- Mashantucket (Western) Pequot Tribal Nation
- Mashpee Wampanoag Tribe of Massachusetts
- Massachusetts Board of Underwater Archaeological Resources
- Massachusetts Historical Commission
- Nantucket Historical Commission (withdrew September 10, 2020)
- Nantucket Historic District Commission (withdrew September 10, 2020)
- Nantucket Planning and Economic Development Commission (withdrew September 10, 2020)
- Nantucket Preservation Trust (withdrew August 27, 2020)
- National Park Service
- Office of the Deputy Assistant Secretary of the Navy for Environment
- Park City Wind
- Rhode Island Historical Preservation & Heritage Commission
- Town and County of Nantucket (withdrew August 27, 2020)
- Town of Barnstable, Historical Commission
- U.S. Army Corps of Engineers
- U. S. Environmental Protection Agency
- Wampanoag Tribe of Gay Head (Aquinnah)

Some of the parties consulted over the course of the NHPA Section 106 review have voluntarily withdrawn from further participation in the consultation, as indicated by the withdrawal date in parentheses for each of those parties.

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ATTACHMENT 3 – HISTORIC PROPERTY TREATMENT PLAN FOR SUBMERGED HISTORICAL PROPERTIES

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# Draft New England Wind Historic Property Treatment Plan for Submerged Historical Properties

*Submitted to:*
BUREAU OF OCEAN ENERGY MANAGEMENT
45600 Woodland Rd
Sterling, VA 20166

*Submitted by:*
Park City Wind LLC

*Prepared by:*

December 2022

# TABLE OF CONTENTS



## List of Figures

## EXECUTIVE SUMMARY

This draft Historic Property Treatment Plan (HPTP) for Submerged Historical Properties (i.e., shipwrecks) potentially affected by the New England Wind project provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation identified during the Section 106 consultation process in the forthcoming Memorandum of Agreement (MOA) with the Bureau of Ocean Energy Management (BOEM), the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation regarding the New England Wind project. The conditions of Construction and Operations Plan (COP) approval and the forthcoming MOA will identify a substantive baseline of specific mitigation measures to resolve the adverse visual effects to the properties identified below as a result of the construction and operation of the New England Wind project (the Undertaking) to satisfy requirements of Section 106 and 110(f) of the National Historic Preservation Act (NHPA) of 1966 (54 USC 300101; United States Code, 2016). This HPTP outlines the implementation steps and timeline for actions, and will be consistent with, or equivalent to, those substantive baseline mitigation measures identified in the conditions of COP approval and forthcoming MOA.

The National Environmental Policy Act (NEPA) substitution process will be utilized by BOEM to fulfill the Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). Furthermore, BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use the NEPA substitution process. This draft HPTP has been provided by the Proponent for inclusion in the Draft Environmental Impact Statement (DEIS) for review by BOEM and consulting parties. Meaningful input on the resolution of adverse effects to, and form(s) of implementation at, the historic properties is anticipated.

This draft HPTP includes the mitigation measures proposed by the Proponent for historic properties based on the evaluations and outreach performed by the Proponent prior to the issuance of the DEIS. It is anticipated that the draft HPTP will undergo further revision and refinement as consultation with the Massachusetts State Historic Preservation Officer, the ACHP, and/or other consulting parties proceeds through the NEPA substitution process. Should BOEM make a finding of adverse effect for the historic property, the mitigation measure(s) described herein (and in revisions) will be included in the Record of Decision (ROD) and/or 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 draft HPTP. This draft HPTP will be reviewed by, and further developed in, consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule.

This draft HPTP is organized into the following sections:

**Executive Summary**

**Section 1.0 Background Information**

This section outlines the content of this HPTP and provides a description of the proposed development of New England Wind.

**Section 2.0 Summary of Historic Property**

This section summarizes the historic property discussed in this HPTP that may be adversely affected by the Undertaking and summarizes the provisions, attachments, and findings that informed the development of this document, most notably the New England Wind Construction and Operations Plan (NE Wind COP) and the Marine Archaeological Resource Assessment Reports (Volume II-D of the COP and Appendix E of the COP Addendum).

**Section 3.0 Mitigation Measures**

This section provides a review of mitigation measures proposed by the Proponent as identified in the COP or through consultation with stakeholders. Mitigation measure details may be revised during the consultation process.

**Section 4.0 Implementation**

This section establishes the process for executing the mitigation measures identified in Section 4.0.

**Section 5.0 References**

This section is a list of works cited for this draft HPTP.

## 1.0 BACKGROUND INFORMATION

### 1.1 Project Overview

New England Wind is the proposal to develop offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and onshore operations and maintenance (O&M) facilities. New England Wind will be developed in two Phases with a maximum of 130 wind turbine generator (WTG) and electrical service platform (ESP) positions. Four or five offshore export cables will transmit electricity generated by the WTGs to onshore transmission systems in the Town of Barnstable, Massachusetts. Figure 1.1-1 provides an overview of the New England Wind project. Park City Wind LLC, a wholly owned subsidiary of Avangrid Renewables, LLC, is the Proponent of this Construction and Operations Plan (COP) and will be responsible for the construction, operation, and decommissioning of New England Wind. The construction, operation, and decommissioning of the New England Wind project are defined as the Undertaking and are subject to Section 106 of the National Historic Preservation Act (NHPA).

New England Wind's offshore renewable wind energy facilities are located immediately southwest of Vineyard Wind 1, which is located in Lease Area OCS-A 0501. New England Wind will occupy all of Lease Area OCS-A 0534 and potentially a portion of Lease Area OCS-A 0501 in the event that Vineyard Wind 1 does not develop "spare" or extra positions included in Lease Area OCS-A 0501 and Vineyard Wind 1 assigns those positions to Lease Area OCS-A 0534. For the purposes of the COP, the Southern Wind Development Area (SWDA) is defined as all of Lease Area OCS-A 0534 and the southwest portion of Lease Area OCS-A 0501, as shown in Figure 1.1-1. The SWDA may be approximately 411–453 square kilometers (km2) (101,590– 111,939 acres) in size depending upon the final footprint of Vineyard Wind 1. At this time, the Proponent does not intend to develop the two positions in the separate aliquots located along the northeastern boundary of Lease Area OCS-A 0501 as part of New England Wind. The SWDA (excluding the two separate aliquots closer to shore) is just over 32 kilometers (km) (20 miles [mi]) from the southwest corner of Martha's Vineyard and approximately 38 km (24 mi) from Nantucket (see Figure 1.1-1). Within the SWDA, the closest WTG is approximately 34.1 km (21.2 mi) from Martha's Vineyard and 40.4 km (25.1 mi) from Nantucket. The WTGs and ESP(s) in the SWDA will be oriented in an east-west, north-south grid pattern with one nautical mile (NM) (1.85 km) spacing between positions.

In order to transmit the power to shore, four or five offshore export cables—two cables for Phase 1 (Park City Wind) and two or three cables for Phase 2 (Commonwealth Wind) will connect the SWDA to shore. Unless technical, logistical, grid interconnection, or other unforeseen issues arise, all New England Wind offshore export cables will be installed within a shared Offshore Export Cable Corridor (OECC) that will travel from the northwestern corner of the SWDA along the northwestern edge of Lease Area OCS-A 0501 (through Vineyard Wind 1) and then head northward along the eastern side of Muskeget Channel toward landfall sites in the Town of Barnstable. The total length of the export cable route is approximately 101 km (Electrical Service Platform to shore). The OECC for New England Wind is largely the same OECC proposed in the approved Vineyard Wind 1 COP, but it has been widened to the west along the entire corridor and to the east in portions of Muskeget Channel. The two Vineyard Wind 1 offshore export cables will also be installed within the New England Wind OECC. To avoid cable crossings, the Phase 1 cables are expected to be located to the west of the Vineyard Wind 1 cables and, subsequently, the Phase 2 cables are expected to be installed to the west of the Phase 1 cables.

While the Proponent intends to install all Phase 2 offshore export cables within this OECC, the Proponent has identified two variations of the OECC that may be employed for Phase 2: the Western Muskeget Variant (which passes along the western side of Muskeget Channel) and the South Coast Variant (which connects to a potential second grid interconnection point) (see Figure 1.1-1). These variations are necessary to provide the Proponent with commercial flexibility should technical, logistical, grid interconnection, or other unforeseen issues arise during the Construction and Operations Plan (COP) review and engineering processes. If it becomes necessary to employ the South Coast Variant and a second grid interconnection point is secured, the Proponent understands that BOEM would conduct a supplemental review of those portions of the South Coast Variant not otherwise considered in the Final Environmental Impact Statement.

This undertaking has the potential to affect submerged cultural resources; therefore, BOEM requires a marine archaeological resource assessment (MARA). The MARA for New England Wind (see COP Volume II-D and Appendix E of the COP Addendum for the South Coast Variant) is intended to assist BOEM and the Massachusetts Historical Commission (MHC), in its role as the State Historic Preservation Officer (SHPO), in their review of New England Wind under Section 106 of the NHPA and the National Environmental Policy Act (NEPA). The Preliminary Area of Potential Effects (PAPE) described herein has been developed to assist BOEM and MHC in identifying historic resources listed, or eligible for listing, in the National Register of Historic Places (National Register) in order to assess the potential effects of New England Wind on historic properties.

Best Management Practices within the MARA include involvement of a Qualified Marine Archaeologist (QMA) in the design, interpretation, and reporting phases of the non-intrusive, high-resolution geophysical (HRG) survey following BOEM's Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585 (BOEM 2020). The responsibility of the QMA is to identify potential submerged cultural resources that may be eligible for listing in the National Register of Historic Places (NRHP) within the PAPE. SEARCH provided technical expertise to the Proponent as the QMA for the SWDA, while Gray & Pape served as the QMA for the OECC and subject matter expert (SME) for that portion of the project.

### *1.1.1 Bottom Disturbing Activities*

The PAPE for offshore wind projects includes the depth and breadth of the seabed potentially impacted by any bottom-disturbing activities. Bottom-disturbing activities within the SWDA are described in Section 1.1 of the MARA (see COP Volume II-D), bottom-disturbing activities within the OECC are described in Section 1.2 of Appendix A of the MARA, and bottom-disturbing activities within the South Coast Variant are defined in Section 1.1 of the South Coast Variant MARA (Appendix E of the COP Addendum). These activities include WTG and ESP foundation installation; scour protection installation; offshore export, inter-array and inter-link cable installation; sand wave dredging in the OECC; vessel anchoring; use of jack-up vessels; and cable protection installation. Potential shipwrecks will be avoided with the implementation of avoidance buffers from the target boundaries as described in Section 2.0 and 3.0.

## 1.2 Historic Property Treatment Plan (HPTP) and Section 106 of the National Historic Preservation Act (NHPA)

This Historic Property Treatment Plan (HPTP) will be developed in accordance with the Section 106 and Section 110(f) review (36 CFR 800) of the Undertaking and the forthcoming Memorandum of Agreement (MOA). This HPTP provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation identified during the Section 106 consultation process in the forthcoming Memorandum of Agreement (MOA) with the Bureau of Ocean Energy Management (BOEM), the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation regarding the New England Wind project.

The MARA reports provided in Volume II-D of the COP and Appendix E of the COP Addendum describe measures to avoid and minimize adverse effects to identified historic properties. Based on this, identified submerged historical properties will be avoided by the Project.

The conditions of COP approval and forthcoming MOA will include measures to avoid adverse effects to identified historic properties and will include measures to minimize adverse effects. This HPTP addresses the remaining mitigation provisions for the properties identified below.

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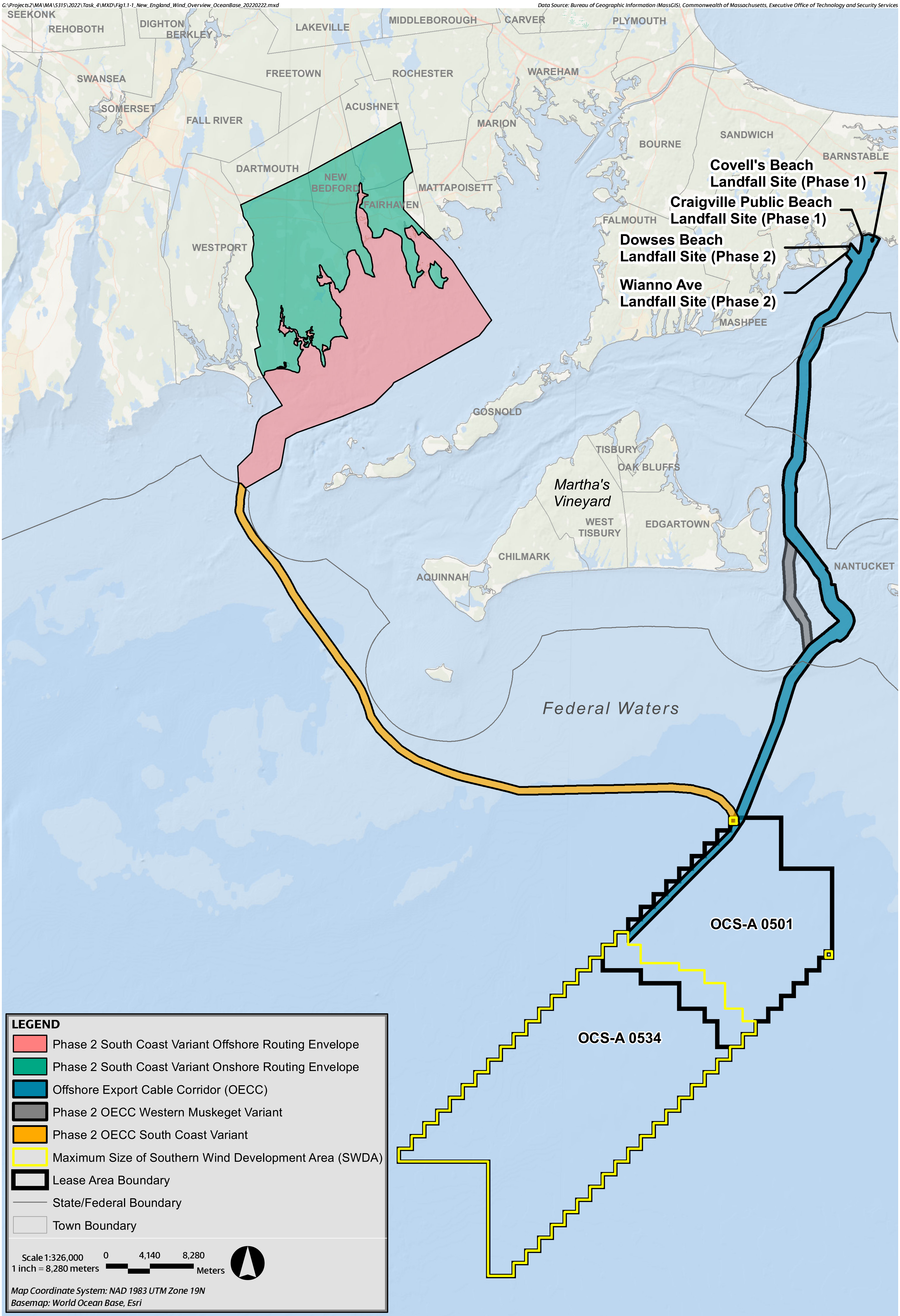


New England Wind
AVANGRID RENEWABLES

**Figure 1.1-1**
*New England Wind Overview*

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All activities implemented under this HPTP will be conducted in accordance with the forthcoming conditionals of COP approval and the forthcoming MOA as well as with applicable local, state, and federal regulations and permitting requirements.

## 1.3 Participating Parties

The National Environmental Policy Act (NEPA) substitution process will be utilized by BOEM to fulfill the Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). BOEM hosted the first Section 106-specific meeting with consulting parties on March 3, 2022 and the Proponent 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.

The Proponent is also conducting outreach meetings with various stakeholders to review the findings of the analysis to date and initiate discussion of proposed avoidance measures. These are parties that demonstrated interest in the affected historic property (Participating Parties). The Proponent has conducted and/or anticipates conducting outreach with the following parties:

- The Massachusetts Historical Commission
- The Massachusetts Board of Underwater Archaeological Resources

The Proponent further anticipates the above-mentioned parties will participate in the finalization of this draft HPTP through BOEM's Section 106 consultation process. This list may be amended if any additional parties are identified or request involvement during this process.

# 2.0 SUMMARY OF HISTORIC PROPERTY (SUBMERGED HISTORICAL PROPERTIES)

The Proponent identified [redacted] potential shipwreck sites (PSWs) within the SWDA (Figure 2.0-1), [redacted], and [redacted] main OECC, [redacted]. In addition, [redacted] PSWs were identified within the Western Muskeget Variant, [redacted], (Figure 2.0-2) and [redacted] possible shipwreck sites were identified within the SCV OECC (Figure 2.0-3). The following figures and tables provide the locations within the Project area as well as site and target dimensions extracted from the geophysical datasets and supporting documents.

Further details on the PSWs are included in the MARA for the SWDA and the OECC (Volume II-D of the COP) and the MARA for the South Coast Variant (Appendix E of the COP Addendum). This supporting document details the field investigation history and geophysical datasets acquired.

## 2.1 Potential Shipwreck Sites

A discussion of the PSWs follows with an overview of site locations in the SWDA, OECC, Western Muskeget Variant, and South Coast Variant (see Table 2.1-1, Figure 2.0-1, Figure 2.0-2 and Figure 2.0-3).

**Table 2.1-1 Historic Properties (PSWs) included in the HPTP**

| Property ID | QMA ID Reference | Status | Mitigation/Treatment |
|---|---|---|---|
| [redacted] | | | |
| [redacted] | [redacted] | Will be avoided by a 50 m radius buffer zone from the extent of the site. [redacted] | Avoided. None required |
| [redacted] | [redacted] | Will be avoided by a 50 m radius buffer zone from the extent of its magnetic field. [redacted]. | Avoided. None required |
| [redacted] | [redacted] | Will be avoided by a 50 m radius buffer from the extent of the site. [redacted]. | Avoided. None required |
| [redacted] | | | |
| [redacted] | [redacted] | Will be avoided by a recommended 100 m radius buffer from the sonar target boundary. [redacted] | Avoided. None required |
| [redacted] | | | |
| [redacted] | [redacted] | Will be avoided by a recommended 50 m radius buffer from the sonar target boundary. [redacted] | Avoided. None required |
| [redacted] | [redacted] | Will be avoided by a recommended 50 m radius buffer from the sonar target boundary. [redacted]. | Avoided. None required |

**Table 2.1-1 Historic Properties (PSWs) included in the HPTP (Continued)**

| Property ID | QMA ID Reference | Status | Mitigation/Treatment |
|---|---|---|---|
| [redacted] | | | |
| [redacted] | [redacted] | Will be avoided by a recommended 60 m radius buffer from the sonar target boundary. | Avoided. None required |
| [redacted] | [redacted] | Will be avoided by a recommended 60 m radius buffer from the sonar target boundary. | Avoided. None required |
| Note: There are a total of [redacted] PSWs identified in the OECC and SWDA, [redacted] in the Western Muskeget Variant, and [redacted] in the South Coast Variant . | | | |

### *2.1.1 Southern Wind Development Area (SWDA)*

#### 2.1.1.1 [redacted]

[redacted]

#### 2.1.1.2 [redacted]

[redacted]

#### 2.1.1.3 [redacted]

[redacted]

[redacted]

### *2.1.2 Offshore Export Cable Corridor (OECC)*

#### 2.1.2.1 [redacted]

[redacted]

### *2.1.3 Western Muskeget Variant* [redacted]

[redacted]

### *2.1.4 South Coast Variant* [redacted]

[redacted]

## 2.2 Historical Context

The waters off southern New England historically and through modern day witnessed a high degree of vessel traffic. The strong weather events and dangerous shoals common in the North Atlantic have contributed heavily to vessel losses in the region. Maritime accidents and shipwrecking events have included yachts and pleasure boats sailing from Block Island, Martha's Vineyard, and the coasts of Rhode Island and Narragansett Bay; fishing vessels operating out of Long Island and Martha's Vineyard; cargo vessels moving goods and fuel out of New York City and Providence; war time losses; and other maritime casualties. Extensive commercial traffic in and around the project areas since the Settlement Period (starting ~1620) equates to possible historical and modern debris scattered on and below the seafloor south of Cape Cod.

[redacted]

New England Wind

AVANGRID RENEWABLES

**Figure 2.0-1**

*Potential shipwreck sites* [redacted] *identified within the SWDA*

[redacted]

New England Wind

AVANGRID RENEWABLES

**Figure 2.0-2**

*Potential shipwreck sites* [redacted] *identified within the OECCs*

[redacted]



**Figure 2.0-3**

*Potential shipwreck sites* [redacted] *identified within the South Coast Variant*

## 3.0 MITIGATION MEASURES

PSWs will be avoided with the implementation of avoidance buffers from the target boundaries. Avoidance buffers are 50-60 m from the edge of the target for the sites where fairly well-defined acoustic targets are present, [redacted] has a 100 m recommended buffer due to the more widely scattered target and anomaly distribution in the area. This avoidance plan complies with the Massachusetts Board of Underwater Archaeological Resources (MBUAR) Policy Guidance for Establishing Shipwreck and Underwater Resource Avoidance Protection Plans. Given the planned avoidance, there would be no adverse effect to submerged historical properties. Accordingly, no mitigation measures are proposed in this HPTP.

# 4.0 IMPLEMENTATION

The Proponent will implement the planned avoidance of the potential shipwreck sites.

The Proponent will prepare and submit annual reports to BOEM during construction of New England Wind. These reports will describe implementation of avoidance buffers.

## 5.0 REFERENCES


Code of Federal Regulations (CFR), 30 CFR Part 585.626(5), https://www.ecfr.gov/current/title-30/part-585/subject-group-ECFRf8a2719ff779a7d, accessed Jan 2022, Content of the Construction and Operations Plan.

Bureau of Ocean Energy Management, 2020. Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585, United States Department of the Interior, May 27, 2020, 23 pp.

Geo SubSea, Gray & Pape, SEARCH, 2022. Proposed Cultural Resource Mitigation for Submerged, Ancient Landforms (draft), New England Wind Project, 87 pp.

Gray & Pape, Inc., 2021. Marine Archaeological Resources Assessment in Support of the New England Wind Construction and Operations Plan for the Offshore Export Cable Corridor, December 2021, 191 pp. (Appendix A of SEARCH, INC. MARA).

Massachusetts Board of Underwater Archaeological Resources (MBUAR). Policy Guidance for Establishing Shipwreck and Underwater Resource Avoidance Protection Plans.

Park City Wind LLC, 2021/2022. Draft New England Wind Construction and Operations Plan for Lease OCS-A 0534, Volumes I (371 pp.), II (361 pp.), and III (934 pp.), December 2021/March 2022.

SEARCH, INC., 2021. Marine Archaeological Resources Assessment for the New England Wind Offshore Wind Farm for OCS-A 0534 Construction and Operations Plan (SWDA Focus), December 2021, 194 pp.

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 January 2022.

# ATTACHMENT 4 – HISTORIC PROPERTY TREATMENT PLAN FOR ANCIENT SUBMERGED LANDFORMS AND FEATURES

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# Draft New England Wind Historic Property Treatment Plan for Submerged Ancient Landforms

*Submitted to:*
BUREAU OF OCEAN ENERGY MANAGEMENT
45600 Woodland Rd
Sterling, VA 20166

*Submitted by:*
Park City Wind LLC

*Prepared by:*

December 2022

# TABLE OF CONTENTS

# TABLE OF CONTENTS



## List of Figures

## EXECUTIVE SUMMARY

This draft Historic Property Treatment Plan (HPTP) for Submerged Ancient Landforms (SALs) adversely affected by the New England Wind project provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation identified during the Section 106 consultation process in the forthcoming Memorandum of Agreement (MOA) with the Bureau of Ocean Energy Management (BOEM), the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation regarding the New England Wind project. The conditions of Construction and Operations Plan (COP) approval and the forthcoming MOA will identify a substantive baseline of specific mitigation measures to resolve the adverse visual effects to the properties identified below as a result of the construction and operation of the New England Wind project (the Undertaking) to satisfy requirements of Section 106 and 110(f) of the National Historic Preservation Act (NHPA) of 1966 (54 USC 300101; United States Code, 2016). This HPTP outlines the implementation steps and timeline for actions, and will be consistent with, or equivalent to, those substantive baseline mitigation measures identified in the conditions of COP approval and forthcoming MOA.

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**Section 5.0 References**

This section is a list of works cited for this draft HPTP.

# 1.0 BACKGROUND INFORMATION

## 1.1 Project Overview

New England Wind is the proposal to develop offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and onshore operations and maintenance (O&M) facilities. New England Wind will be developed in two Phases with a maximum of 130 wind turbine generator (WTG) and electrical service platform (ESP) positions. Four or five offshore export cables will transmit electricity generated by the WTGs to onshore transmission systems in the Town of Barnstable, Massachusetts. Figure 1.1-1 provides an overview of the New England Wind project. Park City Wind LLC, a wholly owned subsidiary of Avangrid Renewables, LLC, is the Proponent of this Construction and Operations Plan (COP) and will be responsible for the construction, operation, and decommissioning of New England Wind. The construction, operation, and decommissioning of the New England Wind project are defined as the Undertaking and are subject to Section 106 of the National Historic Preservation Act (NHPA).

New England Wind's offshore renewable wind energy facilities are located immediately southwest of Vineyard Wind 1, which is located in Lease Area OCS-A 0501. New England Wind will occupy all of Lease Area OCS-A 0534 and potentially a portion of Lease Area OCS-A 0501 in the event that Vineyard Wind 1 does not develop "spare" or extra positions included in Lease Area OCS-A 0501 and Vineyard Wind 1 assigns those positions to Lease Area OCS-A 0534. For the purposes of the COP, the Southern Wind Development Area (SWDA) is defined as all of Lease Area OCS-A 0534 and the southwest portion of Lease Area OCS-A 0501, as shown in Figure 1.1-1. The SWDA may be approximately 411–453 square kilometers (km2) (101,590– 111,939 acres) in size depending upon the final footprint of Vineyard Wind 1. At this time, the Proponent does not intend to develop the two positions in the separate aliquots located along the northeastern boundary of Lease Area OCS-A 0501 as part of New England Wind. The SWDA (excluding the two separate aliquots closer to shore) is just over 32 kilometers (km) (20 miles [mi]) from the southwest corner of Martha's Vineyard and approximately 38 km (24 mi) from Nantucket (see Figure 1.1-1). Within the SWDA, the closest WTG is approximately 34.1 km (21.2 mi) from Martha's Vineyard and 40.4 km (25.1 mi) from Nantucket. The WTGs and ESP(s) in the SWDA will be oriented in an east-west, north-south grid pattern with one nautical mile (NM) (1.85 km) spacing between positions.

In order to transmit the power to shore, four or five offshore export cables—two cables for Phase 1 (Park City Wind) and two or three cables for Phase 2 (Commonwealth Wind) will connect the SWDA to shore. Unless technical, logistical, grid interconnection, or other unforeseen issues arise, all New England Wind offshore export cables will be installed within a shared Offshore Export Cable Corridor (OECC) that will travel from the northwestern corner of the SWDA along the northwestern edge of Lease Area OCS-A 0501 (through Vineyard Wind 1) and then head northward along the eastern side of Muskeget Channel toward landfall sites in the Town of Barnstable. The total length of the export cable route is approximately 101 km (Electrical Service Platform to shore). The OECC for New England Wind is largely the same OECC proposed in the approved Vineyard Wind 1 COP, but it has been widened to the west along the entire corridor and to the east in portions of Muskeget Channel. The two Vineyard Wind 1 offshore export cables will also be installed within the New England Wind OECC. To avoid cable crossings, the Phase 1 cables are expected to be located to the west of the Vineyard Wind 1 cables and, subsequently, the Phase 2 cables are expected to be installed to the west of the Phase 1 cables.

While the Proponent intends to install all Phase 2 offshore export cables within this OECC, the Proponent has identified two variations of the OECC that may be employed for Phase 2: the Western Muskeget Variant (which passes along the western side of Muskeget Channel) and the South Coast Variant (which connects to a potential second grid interconnection point) (see Figure 1.1-1). These variations are necessary to provide the Proponent with commercial flexibility should technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. If it becomes necessary to employ the South Coast Variant and a second grid interconnection point is secured, the Proponent understands that BOEM would conduct a supplemental review of those portions of the South Coast Variant not otherwise considered in the Final Environmental Impact Statement.

This Undertaking has the potential to affect submerged cultural resources; therefore, BOEM requires a marine archaeological resource assessment (MARA). The MARA for New England Wind (see COP Volume II-D and Appendix E of the COP Addendum for the South Coast Variant) is intended to assist BOEM and the Massachusetts Historical Commission (MHC), in its role as the State Historic Preservation Officer (SHPO), in their review of New England Wind under Section 106 of the NHPA and the National Environmental Policy Act (NEPA). The Preliminary Area of Potential Effects (PAPE) described herein has been developed to assist BOEM and MHC in identifying historic resources listed, or eligible for listing, in the National Register of Historic Places (National Register) in order to assess the potential effects of New England Wind on historic properties.

Best Management Practices within the MARA include involvement of a Qualified Marine Archaeologist (QMA) in the design, interpretation, and reporting phases of the non-intrusive, high-resolution geophysical (HRG) survey following BOEM's Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585 (BOEM 2020) and the Massachusetts Board of Underwater Archaeological Resources (MBUAR) Policy Guidance on Archaeological Investigations and Related Survey Standards for the Discovery of Underwater Archaeological Resources. The responsibility of the QMA is to identify potential submerged cultural resources that may be eligible for listing in the National Register of Historic Places (NRHP) within the PAPE. SEARCH provided technical expertise to the Proponent as the QMA for the SWDA, while Gray & Pape served as the QMA for the OECC and subject matter expert (SME) for that portion of the project.

### *1.1.1 Bottom Disturbing Activities*

The PAPE for offshore wind projects includes the depth and breadth of the seabed potentially impacted by any bottom-disturbing activities. Bottom-disturbing activities within the SWDA are described in Section 1.1 of the MARA (see COP Volume II-D), bottom-disturbing activities within the OECC are described in Section 1.2 of Appendix A of the MARA, and bottom-disturbing activities within the South Coast Variant are defined in Section 1.1 of the South Coast Variant MARA (Appendix E of the COP Addendum). These activities include WTG and ESP foundation installation; scour protection installation; offshore export, inter-array and inter-link cable installation; sand wave dredging in the OECC; vessel anchoring; use of jack-up vessels; and cable protection installation.

G:\Projects2\MA\MA\5315\2022\Task_4\MXD\Fig1.1-1_New_England_Wind_Overview_OceanBase_20220222.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

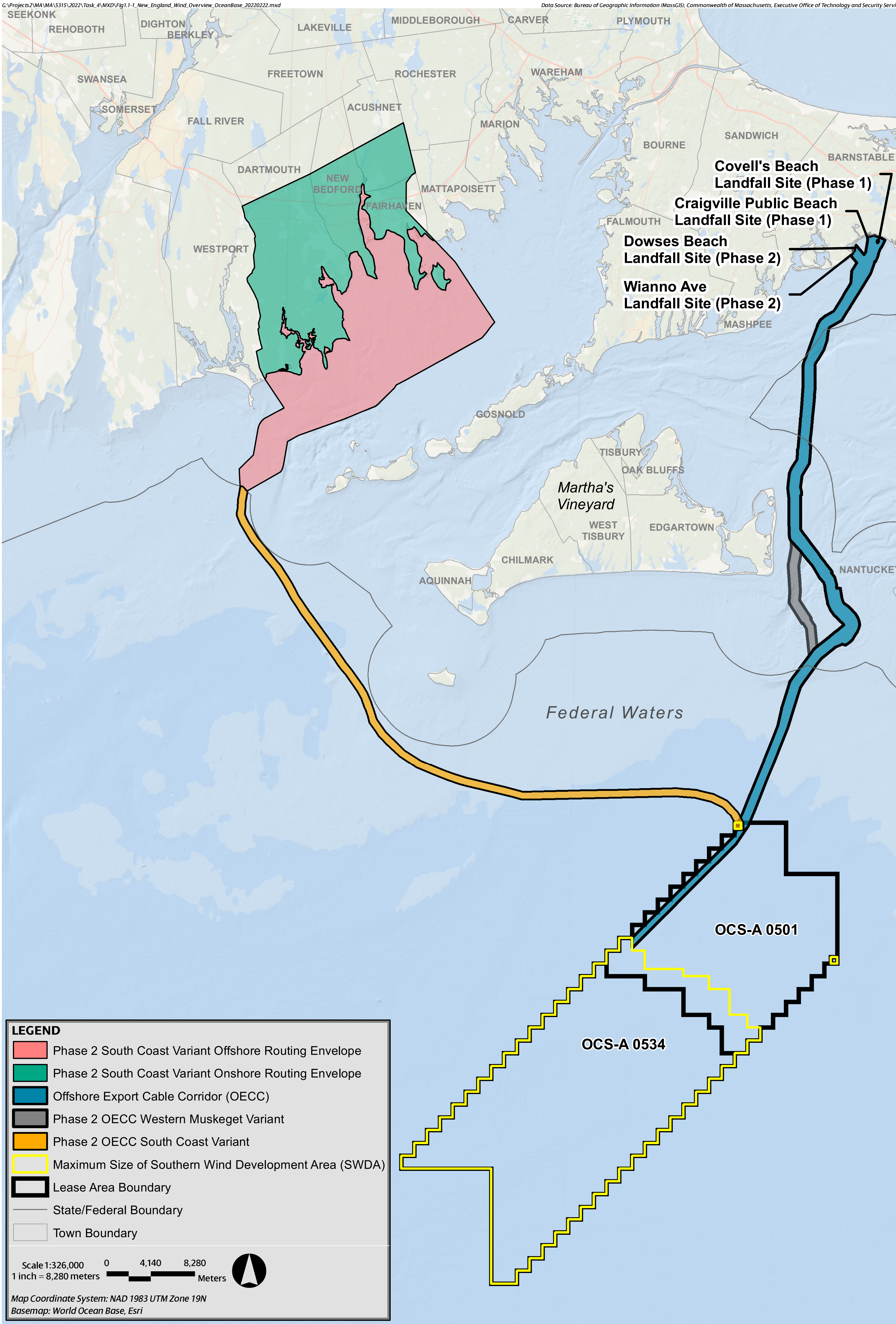


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**Figure 1.1-1**
*New England Wind Overview*

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## 1.2 Historic Property Treatment Plan (HPTP) and Section 106 of the National Historic Preservation Act (NHPA)

This Historic Property Treatment Plan (HPTP) will be developed in accordance with the Section 106 and Section 110(f) review (36 CFR 800) of the Undertaking and the forthcoming Memorandum of Agreement (MOA). This HPTP provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation identified during the Section 106 consultation process in the forthcoming MOA with the BOEM, the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation regarding the New England Wind project.

The MARA reports provided in Volume II-D of the COP and Appendix E of the COP Addendum describes measures to avoid and/or minimize adverse effects to identified historic properties. This HPTP describes the proposed plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the mitigation framework proposed by the Proponent (see Appendix O of MARA in Volume II-D of the COP).

The conditions of COP approval and forthcoming MOA will include measures to avoid adverse effects to identified historic properties and will include measures to minimize adverse effects. This HPTP addresses the remaining mitigation provisions for the properties identified below.

All activities implemented under this HPTP will be conducted in accordance with the forthcoming conditionals of COP approval and the forthcoming MOA as well as with applicable local, state, and federal regulations and permitting requirements.

## 1.3 Participating Parties

The NEPA substitution process will be utilized by BOEM to fulfill the Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). BOEM hosted the first Section 106-specific meeting with consulting parties on March 3, 2022 and the Proponent 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.

The Proponent is also conducting outreach meetings with various stakeholders to review the findings of the analysis to date and initiate discussion of proposed mitigation measures. These are parties that demonstrated interest in the affected historic property (Participating Parties). The Proponent has conducted and/or anticipates conducting outreach with the following parties:

- The Massachusetts Historical Commission
- The Massachusetts Board of Underwater Archaeological Resources
- The Wampanoag Tribe of Gay Head (Aquinnah)
- Mashpee Wampanoag Tribe
- Narragansett Indian Tribe
- Mashantucket Pequot

- Mohegan Tribe of Indians
- Shinnecock Indian Nation
- Delaware Tribe of Indians

The Proponent further anticipates the above-mentioned parties will participate in the finalization of this draft HPTP through BOEM's Section 106 consultation process. This list may be amended if any additional parties are identified or request involvement during this process.

## 2.0 SUMMARY OF HISTORIC PROPERTY (SUBMERGED ANCIENT LANDFORMS)

Submerged ancient landforms (SALs) have been identified within the SWDA and the OECC. [redacted]

[redacted]

[redacted]

Further details on the SALs are included in the MARA (Volume II-D of the COP). These supporting documents detail the field investigation history and geophysical datasets acquired.

### 2.1 Submerged Ancient Landforms

A discussion of the SALs that may be impacted follows with an overview of site locations in the SWDA and OECC in Figure 2.1-1 and Figure 2.1-2, respectively. SALs associated with the South Coast Variant are shown in Figure 2.1-3. Numerous additional SALs were identified and mapped outside the PAPE and are thus not adversely affected.

#### *2.1.1 Physical Description and Existing Conditions*

SALs are interpreted as remnants of past terrestrial and shallow marine environments that existed along previous coastlines during lower stands of sea level. The landforms now appear buried below the seafloor at varying depths due to different processes acting upon the continental shelf over the past 15,000 years. While no intact archaeological artifacts, deposits, resources, or sites have been identified offshore, the SALs represent locations of higher significance with the potential to contain those cultural resources.

Table 2-1 below summarizes the SALs that are unavoidable by the Project [redacted] This means that installation of a project component (WTG foundation, inter-array cable [IAC] or export cable [EC]) and the associated construction activities (spudding, anchoring, dredging) may impact the SAL.

**Table 2-1 Historic Properties (SALs) included in this HPTP**

[redacted]

**Table 2-1 Historic Properties (SALs) included in this HPTP (Continued)**

[redacted]

**Table 2-1 Historic Properties (SALs) included in this HPTP (Continued)**

[redacted]

### *2.1.2 Historic Context*

The identification of submerged paleolandscapes offers the potential to locate areas of archaeological interest and further our understanding of landscapes available for settlement by early cultural groups (Robinson et al. 2020). Using predictive models for shoreline migration, archaeologists can correlate dates and cultural periods with geological features on the submerged paleolandscape. Certain environmental factors are weighed when considering archaeological probability. Proximity to sources of fresh water, and thus the fauna that were drawn to them, was a significant determinant in the choice of pre-contact settlement locations (Gillam and Gillam 2016). Paleochannel terraces and floodplains exist intact on the OCS, as a result of sediment burial linked to large-scale flooding events by nearby water sources, and therefore retain the highest probability of containing intact pre-contact cultural resources (Joy 2018). Additionally, low-lying areas (e.g., estuaries) require low energy sea-level rise to become inundated; rapid sea-level rise would have submerged these environments quickly and deeply, possibly burying intact terrestrial soils. Therefore, these types of areas may possess a greater preservation potential than higher elevations, which are more likely to be affected by marine transgression and shoreface erosion.

### *2.1.3 NRHP Criteria*

These SALs are considered to be significant for their potential to aid in our understanding of pre-Contact settlement along the OCS and the cultural and historical significance of these features to Native American Tribes and are recommended eligible for listing in the NRHP under Criterion D.

[redacted]

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**Figure 2.1-1**

*SAL avoidance areas interpreted and mapped in the SWDA*

[redacted]



**Figure 2.1-2**

*SAL avoidance areas interpreted and mapped in the OECC and Western Muskeget Variant*

[redacted]

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**Figure 2.1-3**

*SAL avoidance areas interpreted and mapped in the South Coast Variant*

# 3.0 MITIGATION MEASURES

This section provides details on the proposed mitigation measures at the historic properties to address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project.

## 3.1 Pre-Construction Geoarchaeology

In order to mitigate adverse effects to SALs, New England Wind is proposing to conduct additional archaeological investigations on unavoidable submerged, ancient landforms in the SWDA and OECC. This work will be consistent with an archaeological mitigation-level effort to recover additional information on the SALs to better ascertain their chronological setting, archaeological period association, their environmental setting, and whether evidence of human habitation exists within them. As such, additional vibracores will be acquired [redacted].

### *3.1.1 Purpose and Intended Outcome*

The objective of this mitigation approach is to acquire additional environmental and archaeological data to refine our understanding of the paleoenvironmental landscape and archaeological sensitivity of the Outer Continental Shelf (OCS) within the Project's PAPE and to establish a study that provides paleolandscape data that builds upon baseline data and can be used by future offshore projects to aid in landscape management.

Coring and sediment sampling can transform the relative stratigraphic interpretation of acoustic data into a reconstruction of subsurface stratigraphy and environmental conditions at a given point offshore grounded by absolute dating and illustrated by grain size, pollen, macrobotanical, micro-debitage, geochemical, and/or or point-count analysis. This information can be used to create a better understanding of the geographical, operational, and modified environments as described in the research questions below. In the case of the PAPE, these research questions will fulfill the need for mitigation of submerged, ancient landforms that cannot be avoided during construction activities. They can also be used to test broader hypotheses concerning the nature of the submerged landscape in Nantucket Sound, Muskeget Channel, and the OCS offshore Massachusetts. The results of such hypothesis testing also inform broader questions around human habitation on now-inundated landscapes within the Southern New England region of the OCS.

### *3.1.2 Scope of Work*

This mitigation scope has specifically been built upon ongoing Section 106 Mitigation Studies currently underway (Vineyard Wind 1), with the intent of not duplicating but expanding upon the data acquisition approaches and techniques for assessing paleo-landscapes and environments.

A variety of SAL types are planned for sampling: [redacted]

A select number of SALs will be tested using closely spaced vibracoring designed to examine these features at a higher spatial resolution. The exact number of cores in each location will be constrained by the landform size as estimated based on previous geophysical and geotechnical study. [redacted] New England Wind may opt to use an alternate section of the OECC, known as the Western Muskeget Variant. The Western Muskeget Variant includes [redacted] submerged, ancient landforms identified within the interpreted Channel Groups that cannot be avoided; therefore, potential mitigation of this OECC variant would include supplemental acquisition of up to [redacted] cores (if ongoing engineering work indicates that the Western Muskeget Variant is likely to be used). Sampling and analyses for the Western Muskeget Variant cores will follow the same methods and protocols as those outlined for the [redacted] the OECC. The total number of vibracores to be collected in the OECC (including the Western Muskeget Variant) would be [redacted].

Geotechnical and geophysical surveys and the associated marine archaeological analyses were completed for the South Coast Variant. If ongoing engineering work indicates that the South Coast Variant is likely to be used, any submerged, ancient landforms that cannot be avoided will be mitigated for following the same methods and protocols as those outlined for the OECC.  The total number of vibracores to be collected for the South Coast Variant would be [redacted].  Sampling and analyses for the South Coast Variant cores will follow the same methods and protocols as those outlined for the proposed cores from the OECC described above.

In the SWDA, a combination of collecting [redacted] cores at the majority of the SALs to sample identified horizons and collecting a series of closely spaced cores at [redacted] SALs based on similar geomorphic characteristics will be utilized.

The exact number of cores per SAL and their placement will be selected following a review of all available geophysical and geotechnical data, and specifically for their ability to provide data that will address the research questions outlined in the original mitigation plan. MBUAR, MHC, and Tribal representatives are expected to participate during every stage of the study and will be given the opportunity to review and comment on proposed core locations and their input incorporated into the coring plan.

The Proponent will release a request for proposals (RFP) for consultant services to complete this scope of work and will consult with Participating Parties in defining objectives and scope of work, as well as in the consultant selection process.

### *3.1.3 Research Questions*

Coring and sediment sampling can transform the relative stratigraphic interpretation of acoustic data into a reconstruction of subsurface stratigraphy and environmental conditions at a given point offshore, grounded by absolute dating and illustrated by grain size, pollen, macrobotanical, micro-debitage, geochemical, and/or or point-count analysis. This information can be used to create a better understanding of the geographical, operational, and modified environments as described in the research questions below. In the case of the PAPE, these research questions will fulfill the need for mitigation of submerged, ancient landforms that cannot be avoided during construction activities. They can also be used to test broader hypotheses concerning the nature of the submerged landscape in Nantucket Sound, Muskeget Channel, and the OCS offshore Massachusetts. The results of such hypothesis testing also inform broader questions around human habitation on now-inundated landscapes within the Southern New England region of the OCS.

#### 3.1.3.1 The Geographical Environment

The geographical environment, that comprises the physical landscape, has been at least partially documented by the acoustic data as buried coastal features and/or the ravinement surface in the shallow subsurface. However, the data collected to date do not demonstrate that the physical landscape at these locations was utilized for human occupation. Answering this question will require a more intensive, targeted approach to testing specific submerged, ancient landforms. Based on previous coring efforts, three distinct submerged, ancient landform types were identified [redacted] The three submerged, ancient landform types were consistently identified across multiple Channel Groups, suggesting that information from one Channel Group location may provide information about the submerged, ancient landform's role within the overall landscape at the time of subaerial exposure and potential human occupation or exploitation. Following stakeholder input on sampling locations each of the three submerged, ancient landform types will be tested using closely spaced vibracores designed to examine these landforms at a higher spatial resolution. The exact number of cores from each submerged, ancient landform type will be constrained by the landform size as estimated within the specific Channel Group selected for testing, and as mapped from previous geophysical and geotechnical study.

**Research Question 1.** What is the geomorphological and chronological setting of the submerged, ancient landform?

This research question will be addressed by geoarchaeological analysis of sediments recovered within vibracores, and as appropriate, radiocarbon dating of organic material recovered within the samples.

#### 3.1.3.2 The Operational Environment

As noted above, the operational environment consists of the resources available for human use in the environment. Resources may include plants, animals, minerals, and water. Generally, it is possible to paint a broad picture of the paleoenvironment based on palynological, macro-botanical, and microfossil evidence recovered from sediment cores.

**Research Question 2**. What was the paleoenvironmental setting at the time the submerged, ancient landform was exposed?

This question will be addressed through the analysis of palynological, macro-botanical, and microfossil samples recovered from cores within terrestrial-originating deposits. Pollen remains are relatively durable in sediments and will provide information on the past vegetation of the area and may even identify food or medicinal sources for past occupations. Macro-botanicals, when present, can complement palynological analysis to provide site-specific evidence for floral species present at a sample location. Microfossil analysis, particularly that seeking for diatoms, can offer information concerning hydrology at the site location; some taxa prefer freshwater, others saline, indicating whether or not any wetland deposits associated with these landforms were freshwater or coastal wetlands.

#### 3.1.3.3 The Modified Environment

The modified environment is one that shows direct evidence of human use. This evidence may include actual artifacts created by humans, plant or animal remains indicating their use as subsistence resources by human groups, or chemical changes to the soil resulting from human occupation.

**Research Question 3.** Is there evidence of human modification of the environment?

This research question will be addressed through bulk geochemical analysis of nitrogen, faunal analysis of any bone or shell materials suggesting use of these as subsistence resources, bulk geochemical analysis of sediments for elements consistent with human occupation of a land surface such as nitrogen, and screening of the vibracore samples to collect any micro-debitage present.

#### 3.1.3.4 Nantucket Sound Paleoenvironment

The additional work proposed herein has the ability to contribute_information on the environmental history of Nantucket Sound and offshore waters south of the islands.

**Research Question 4.** How do the results of the additional archaeological mitigation investigation fit within the broader geomorphological and paleoenvironmental context of Nantucket Sound?

This research question will be addressed during the planned review and synthesis of existing data and through a comparison of the results of the proposed mitigation activities with results from geological studies in available literature.

### *3.1.4 Core Analysis Methodology*

Once the cores arrive at the laboratory, the sections will be cut open and split vertically in half, then logged and photographed by the Project QMA and team (including a geoarchaeologist). Half of the core will undergo a geoarchaeological assessment while the other half will be archived for future reference (archival length of time and location to be determined with stakeholders). The purpose of the geoarchaeological investigation of the vibracore samples is to identify elements of the preserved environments, as specified in the research questions (Section 3.3.3). Analysis will be focused on descriptive aspects that may be helpful in identifying whether a sample represented a marine sedimentary deposit or a coastal and/or terrestrial sedimentary deposit.

The core analysis will proceed in a stepwise fashion designed to maximize recovery of useful data from cores. Specific supplemental analyses (e.g., macro-botanical) will be conducted where appropriate.

**Stage One: Geographical Environmental Analysis**

1. Core splitting and scalar photography.
2. Geoarchaeological assessment of sediments in each core to identify preserved terrestrial landforms.
3. Selection of organic materials for radiocarbon dating if appropriate (see notes below).

**Stage Two: Operational Environmental Analysis**

1. Macro-botanical and micro-botanical analysis of terrestrial sediments to identify floral species represented at the core location.
2. Macro- and micro-fossil analysis of terrestrial sediment to identify faunal species present at the core location, followed by a refinement of the interpretation of the geographical/geomorphological context for the core location (e.g., coastal wetland versus inland wetland, for example, or alluvial terrace versus shoreface).

**Stage Three: Modified Environmental Analysis**

1. X-Ray Fluorescence (XRF) analysis for bulk elemental analysis of terrestrial landforms to seek geochemical evidence for human habitation.
2. Examination of any bone or shell materials present for evidence of human modification.
3. Micro-debitage analysis for evidence of human technological activities.

Terrestrial-originating deposits, representing glacially or postglacially deposited sediments, will be identified based on observed characteristics, including evidence of soil formation and/or remnant soil horizons; a structure other than single grained or massive; lack, or near lack, of marine shell; and the presence of organic materials of a possible terrestrial origin. Marine sediments, representing reworked glacially deposited sediments, will be identified by characteristics, including a lack of evidence of soil formation; a single grained or massive structure; the presence of marine shells; and the lack, or near lack, of organic materials of a possible terrestrial origin.

Descriptions of the core samples will follow set standards in accordance with United States Department of Agriculture (USDA) terminology discussed in the Soil Survey Manual (Soil Survey Staff, 1993, 2010). Descriptions of the samples will be recorded while the soil is in a moistened condition and will include (when possible) soil horizon, Munsell color, texture, mottling, soil structure, ped coatings, sedimentary structure and bedding characteristics, moisture consistency, boundary type, and inclusions, such as organic material or cultural artifacts. These descriptions will be recorded in accordance with the observed master horizons (with suitable subdivisions), noting any possible lithologic discontinuities (Stafford, 2004; Stafford & Creasman, 2002). These analyses will provide context to the sample and, possibly, to the type of landform (marine or terrestrial) from which the sample originated.

Once the geomorphology is described, subsamples will be taken from each core, including radiocarbon dating, bulk core geochemical analysis, palynological analysis, faunal analysis, and micro-debitage analysis. The locations of these samples will be dependent upon what is identified in each core, as documented by the QMA and geoarchaeologist. Specifically, these subsampling techniques will occur within identified terrestrial-originating deposits. Radiocarbon sampling may include direct dating of larger fragments of carbon, or bulk carbon of the sediments themselves depending on the availability of carbon within the identified soil horizons. These samples will aid in determining the age of the landform, including its uppermost and lowermost depositional ages. Samples will be collected and supplied to a third-party laboratory for Accelerator Mass Spectrometry (AMS) dating.

Soil samples for bulk core geochemical analysis within the cores will also be collected. These samples will then be sent to the Paleo Research Institute, Golden, Colorado, for processing using XRF or a similarly qualified facility. Human activity modifies a soil's chemical characteristics by altering the amount of carbon, phosphorus, nitrogen, or carbonates within the deposits, typically increasing the ratios of carbon and nitrogen. Bulk core geochemical analysis can aid in determining the presence or absence of humans on a landform.

Palynological samples within terrestrial-originating deposits will be collected. Pollen is relatively durable in sediments and will provide information on the past vegetation of the area and may even identify food or medicinal sources for past occupations. Likewise, macro-botanical samples recovered from terrestrial-originating deposits can provide localized information concerning floral assemblages from a core location, and as with pollen, may even identify food or medicinal sources used by past human populations. Samples will be sent to the Paleo Research Institute, Golden, Colorado, or a similarly qualified facility for processing and analysis.

Faunal analysis of shell and bone will be carried out after sub-sampling for geochemical and palynological analyses. These analyses will examine any shell and bone that may be recovered from core samples that suggests these materials were deposited during human subsistence activities. Evidence for subsistence activities can include the following: deposits containing taxa known to occupy different environmental contexts (such as shellfish mingled with large mammal bones); signs of burning on shell or bone, shell deposits with only one taxon suggesting intentional harvesting.

Micro-debitage analysis will occur once all other samples are collected as this will destroy the remaining sample. This will determine the presence or absence of micro-debitage left behind by human production of stone tools. The remaining sediments of the core will be sorted through a geological sieve in search of lithic material related to the reduction stages of stone tool making. Micro-debitage measures less than 1 mm in size and can be abundant on archaeological sites around tool-making areas. Micro-debitage will be viewed using light microscopy and scanning electron microscopy methods, as available, to better identify their characteristics.

In the unlikely event that an archeological resource(s) is found in the cores, New England Wind will discuss arranging permanent curation or other appropriate next steps for the archaeological resource(s) with MBUAR for portions of the Project within state waters, and BOEM and the Tribes for both state and federal waters.

#### *3.1.5 Standards*

The Preconstruction Geoarchaeology work 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 QMAs.

#### *3.1.6 Documentation*

The Proponent will provide the following documentation to the Participating Parties for their review:

- Technical Report (draft and final versions).
- Technical Presentation (draft and final versions).

All results will be delivered to the Participating Parties in the form of a technical report with supporting digital data files.

Draft products will incur one round of review with edits and suggestions addressed in a given time frame, and final products issued thereafter. The technical report is designed to provide all the detail surrounding the Pre-Construction Geoarchaeology study methods and results from the scientific standpoint. The technical presentation is designed for use by all relevant stakeholders and the Tribes and government agencies and will explain how the study was accomplished and results achieved in a more informal, visual format. The approach and focus of these products will be discussed during the consultation and thus some objectives of these deliverables could change.

Products focused directly for the Tribes are discussed in Section 3.3.

#### *3.1.7 Funds and Accounting*

It is understood that the Proponent will be responsible for funding and implementing the mitigation measures described in this section.  The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

#### *3.1.8 Sampling Sensitivity*

The Tribes have expressed concern with disturbance of the subsurface [redacted] from pre-construction geoarchaeology surveys. In response to this feedback, the Proponent proposes a moderate quantity of vibracores to balance the collection of important information with the desire to minimize disturbances to SALs within the [redacted].

## 3.2 Post-construction Seafloor Assessment

The MARA identifies multiple SALs that cannot be completely avoided by New England Wind.  The Proponent proposes additional mitigation with the specific intent of identifying and assessing direct adverse effects to buried SALs as a result of construction activities including cable installation and anchoring. Impacts are expected to include bottom disturbance associated with WTG and ESP foundation installation; scour protection installation; offshore export, inter-array and inter-link cable installation; sand wave dredging in the OECC; vessel anchoring; use of jack-up vessels; and cable protection installation. To assess the full effects of construction, this assessment will be conducted as soon as possible following completion of bottom-disturbing activities.

The post-construction seafloor assessment will be conducted via a visual inspection survey. The Proponent proposes to use remote operated vehicle (ROV) technology as the primary investigative tool to conduct the survey. This method will allow for the collection of data while avoiding unnecessary health and safety risks associated with diving. This survey would include visual inspection of only those portions of the cable trench where it has intersected an interpreted SAL with a high preservation potential for evidence of human occupation, or where anchors and associated anchor chain sweep directly overlie an interpreted, buried, high potential SAL.

The Proponent's QMAs will develop a survey design that will be submitted to BOEM for review and comment prior to deployment. The visual inspection will consider those methods best suited for reconnaissance level survey of post-construction impacts and potential documentation of disarticulated material at the seafloor and address up to [redacted]

Results from this survey would be documented in a final report from the QMA.

## 3.3 Tribal Focused Mitigation

The following ideas and mitigation plans have been proposed to support Tribal objectives, to be further discussed during the consultation process.

- A detailed PowerPoint presentation will be generated to describe the scientific methods and processes undertaken as part of the offshore pre-construction surveys and archaeological assessment to document the buried and submerged, ancient landforms [redacted]. This will be a technical and descriptive visual document to record all aspects of how the submerged, ancient landform study was performed and describe the results that were obtained. Input from the Tribes will help shape the background and supporting material that is desired for inclusion.
- Results of the submerged, ancient landform data analysis and mapping will be assembled in a digital format for use by the Tribes. This digital database will document the geographic location and vertical placement of the submerged, ancient landforms. A number of different geographical mapping software packages could be used for this, but we envision potentially interfacing the data in QGIS1 (freeware) with the Tribes.

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1 QGIS is powerful and open-source mapping software that allows users to import and create digital projects, charts, figures, and export all of the above for external use and is compatible with all ESRI ArcGIS products.

- The Project proponent team will setup one workshop for each Tribe to provide hands-on training for the use of the selected GIS software. This would include assistance getting the GIS software configured on a computer (provided by the Tribes) and the database loaded and operational. A tutorial on software use and guidance on viewing the information will be provided.
- Option of having a special in-person presentation of the submerged, ancient landform study results to the Tribal representatives and community.

One presentation for each Tribe could be planned and, as requested, tailored for the audience specified by each Tribe. Presentations would generally focus on the topic of the offshore environment and submerged landscapes. For example, Tribes may request that a presentation be given during a meeting of the tribal leaders and historic preservation office personnel, delivered to high school level students, or as a collaborative presentation given at a national tribal meeting. These various events offer opportunities to share within and among Tribes the knowledge that has been gained by the submerged landscape mitigation study. The Project proponent will develop the presentation resources and provide an opportunity for MHC and MBUAR to participate and comment on draft materials where feasible.

# 4.0 IMPLEMENTATION

Construction activities of the Undertaking that adversely affect a specific historic property cannot begin until BOEM has accepted the HPTP for that specific adversely affected historic property, consistent with the forthcoming conditions of COP approval. Construction activities that do not adversely affect historic properties may proceed prior to acceptance of the HPTPs.

## 4.1 Timeline

The timeline and organizational responsibilities will be developed in consultation with BOEM and the Participating Parties as the conditions of COP approval and the MOA are developed concurrent with BOEM's NEPA substitution schedule for New England Wind which is currently anticipated to include the following key dates:

- December 2022 – Release of the Draft Environmental Impact Statement (DEIS) followed by a 60-day comment period for the DEIS.
- September 2023 -- Release of Final Environmental Impact Statement (FEIS).
- October 2023 -- NEPA Record of Decision (ROD) issuance.

It is anticipated that the mitigation measures identified in Section 3.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the Participating Parties and accepted by BOEM. Per Section 3.0, the Participating Parties will have a minimum of 45 days to review and comment on all draft reports or other work products developed for this HPTP. The Proponent 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 Participating Parties and accepted by BOEM.

## 4.2 Organizational Responsibilities

### *4.2.1 Bureau of Ocean Energy Management (BOEM)*

- BOEM is responsible for making all federal decisions and determining compliance with Section 106.
- BOEM must review and accept the HPTP before the implementing party may commence any actions.
- BOEM is responsible for consultation related to dispute resolution.
- BOEM in consultation with the Participating Parties will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA.
- BOEM will be responsible for sharing the annual summary report with Participating Parties.

### *4.2.2 Avangrid Renewables, LLC*

- The Proponent will be responsible for implementing the HPTP.

- The Proponent will be responsible for considering the comments provided by the parties identified.
- Annual reporting to BOEM on implementation of the HPTP.
- Reporting responsibilities will be further outlined in consultation with BOEM as the HPTP is developed.
- Funding the mitigation measures specified in Section 3.0
- Completion of the scope(s) of work in Section 3.0
- Ensuring all Standards in Section 3.0 are met
- Providing the Documentation in Section 3.0 to the Participating Parties for review and comment
- The Proponent 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

#### *4.2.3 Massachusetts Historical Commission (MHC); Massachusetts State Historic Preservation Officer; Massachusetts Bureau of Underwater Archaeological Resources*

The state agencies will be participating stakeholders and provide subject matter expertise to support completion of the HPTP mitigation and compliance with all state regulations.

#### *4.2.4 Participating Parties*

- Provide feedback on draft scope of work, RFP, and consultant bids within 45 days.
- Tribes to provide input to shape the background and supporting material that is desired for inclusion in the PowerPoint presentation and digital database/GIS deliverable.
- Provide feedback on draft materials within 45 days.

#### *4.2.5 Other Parties*

The Proponent does not anticipate additional Participating Parties; however, should any be determined, this will be updated.

### 4.3 Participating Party Consultation

The Proponent has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide input on the resolution of adverse effects to, and forms of implementing mitigation, at the historic properties. As part of the development of this draft HPTP, the Proponent will continue to conduct targeted outreach with the Participating Parties identified in Section 1.3. Notification will be sent to BOEM and applicable Participating Parties that the Treatment Plan has been implemented and is complete upon final development of the conditions of COP approval, the forthcoming MOA, and this HPTP.

## 5.0 REFERENCES


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ATTACHMENT 5 – HISTORIC PROPERTY TREATMENT PLAN FOR THE EDWIN VANDERHOOP HOMESTEAD AND GAY HEAD – AQUINNAH SHOPS AREA

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# Draft New England Wind Historic Property Treatment Plan for the Edwin Vanderhoop Homestead and the Gay Head – Aquinnah Shops Area

*Submitted to:*
BUREAU OF OCEAN ENERGY MANAGEMENT
45600 Woodland Rd
Sterling, VA 20166

*Submitted by:*
Park City Wind LLC

*Prepared by:*
Epsilon Associates Inc.

December 2022

# TABLE OF CONTENTS



## List of Figures

## EXECUTIVE SUMMARY

This draft Historic Property Treatment Plan (HPTP) for the Edwin Vanderhoop Homestead and the Gay Head – Aquinnah Shops Area adversely affected by New England Wind provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation identified during the Section 106 consultation process in the forthcoming Memorandum of Agreement (MOA) with the Bureau of Ocean Energy Management (BOEM), the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation regarding the New England Wind project. The conditions of Construction and Operations Plan (COP) approval and the forthcoming MOA will identify a substantive baseline of specific mitigation measures to resolve the adverse visual effects to the properties identified below as a result of the construction and operation of New England Wind (the Undertaking) to satisfy requirements of Section 106 and 110(f) of the National Historic Preservation Act (NHPA) of 1966 (54 USC 300101; United States Code, 2016). This HPTP outlines the implementation steps and timeline for actions, and will be consistent with, or equivalent to, those substantive baseline mitigation measures identified in the conditions of COP approval and forthcoming MOA.

The National Environmental Policy Act (NEPA) substitution process will be utilized by BOEM to fulfill the Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). Furthermore, BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use the NEPA substitution process. This draft HPTP has been provided by the Proponent for inclusion in the Draft Environmental Impact Statement (DEIS) for review by BOEM and consulting parties. Meaningful input on the resolution of adverse effects to, and form(s) of implementation at, the historic properties is anticipated.

This draft HPTP includes the mitigation measures proposed by the Proponent for historic properties based on the evaluations and outreach performed by the Proponent prior to the issuance of the DEIS. It is anticipated that the draft HPTP will sustain further revision and refinement as consultation with the Massachusetts State Historic Preservation Officer, the ACHP, and/or other consulting parties through the NEPA substitution process. Should BOEM make a finding of adverse effect for the historic property, the mitigation measure(s) described herein (and in revisions) will be included in the Record of Decision (ROD) and/or 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 draft HPTP. This draft HPTP will be reviewed by, and further developed in, consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule.

This draft HPTP is organized into the following sections:

**Executive Summary**

**Section 1.0 Background Information**

This section outlines the content of this HPTP and provides a description of the proposed development of New England Wind.

**Section 2.0 Summary of Historic Property**

This section summarizes the historic property discussed in this HPTP that may be adversely affected by the Undertaking and summarizes the provisions, attachments, and findings that informed the development of this document, most notably the New England Wind Construction and Operations Plan (NE Wind COP) and the Historic Properties Visual Impact Assessment (Appendix III-H.b).

**Section 3.0 Mitigation Measures**

This section provides a review of mitigation measures proposed by the Proponent as identified in the COP or through consultation with stakeholders. Mitigation measure details may be revised during the consultation process.

**Section 4.0 Implementation**

This section establishes the process for executing the mitigation measures identified in Section 4.0. As the consultation process continues, details for each mitigation measure such as the organizational responsibilities, timeline, and regulatory review requirements will continue to be outlined.

**Section 5.0 References**

This section is a list of works cited for this draft HPTP.

# 1.0 BACKGROUND INFORMATION

## 1.1 Project Overview

New England Wind is the proposal to develop offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and onshore operations and maintenance (O&M) facilities. New England Wind will be developed in two Phases with a maximum of 130 wind turbine generator (WTG) and/or electrical service platform (ESP) positions. Four or five offshore export cables will transmit electricity generated by the WTGs to onshore transmission systems in the Town of Barnstable, Massachusetts. Figure 1.1-1 provides an overview of the New England Wind project. Park City Wind LLC, a wholly owned subsidiary of Avangrid Renewables, LLC, is the Proponent of this Construction and Operations Plan (COP) and will be responsible for the construction, operation, and decommissioning of New England Wind. The construction, operation, and decommissioning of the New England Wind project are defined as the Undertaking and are subject to Section 106 of the National Historic Preservation Act (NHPA).

New England Wind's offshore renewable wind energy facilities are located immediately southwest of Vineyard Wind 1, which is located in Lease Area OCS-A 0501. New England Wind will occupy all of Lease Area OCS-A 0534 and potentially a portion of Lease Area OCS-A 0501 in the event that Vineyard Wind 1 does not develop "spare" or extra positions included in Lease Area OCS-A 0501 and Vineyard Wind 1 assigns those positions to Lease Area OCS-A 0534. For the purposes of the COP, the Southern Wind Development Area (SWDA) is defined as all of Lease Area OCS-A 0534 and the southwest portion of Lease Area OCS-A 0501, as shown in Figure 1.1-1. The SWDA may be approximately 411–453 square kilometers (km2) (101,590– 111,939 acres) in size depending upon the final footprint of Vineyard Wind 1. At this time, the Proponent does not intend to develop the two positions in the separate aliquots located along the northeastern boundary of Lease Area OCS-A 0501 as part of New England Wind. The SWDA (excluding the two separate aliquots closer to shore) is just over 32 kilometers (km) (20 miles [mi]) from the southwest corner of Martha's Vineyard and approximately 38 km (24 mi) from Nantucket (see Figure 1.1-2). Within the SWDA, the closest WTG is approximately 34.1 km (21.2 mi) from Martha's Vineyard and 40.4 km (25.1 mi) from Nantucket. The WTGs and ESP(s) in the SWDA will be oriented in an east-west, north-south grid pattern with one nautical mile (NM) (1.85 km) spacing between positions.

The Historic Properties Visual Impact Assessment (Appendix III-H.b of COP Volume III) for New England Wind is intended to assist BOEM and the Massachusetts Historical Commission (MHC), in its role as the State Historic Preservation Officer (SHPO), in their review of New England Wind under Section 106 of the NHPA and the National Environmental Policy Act. The Preliminary Area of Potential Effects (PAPE) described herein has been developed to assist BOEM and MHC in identifying historic resources listed, or eligible for listing, in the National Register of Historic Places (National Register) in order to assess the potential effects of New England Wind on historic properties.

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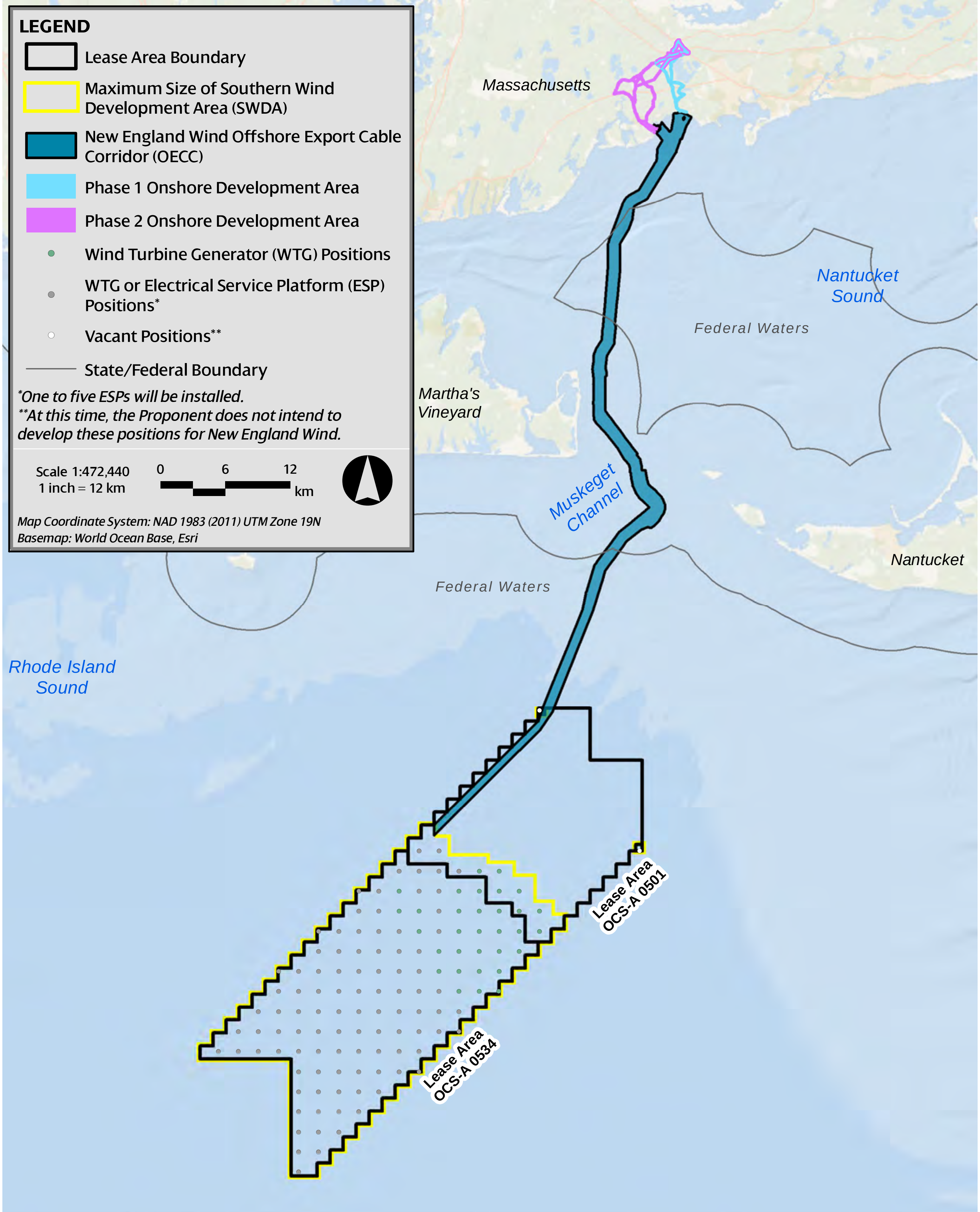


New England Wind
AVANGRID RENEWABLES

**Figure 1.1-1**
*New England Wind Overview*

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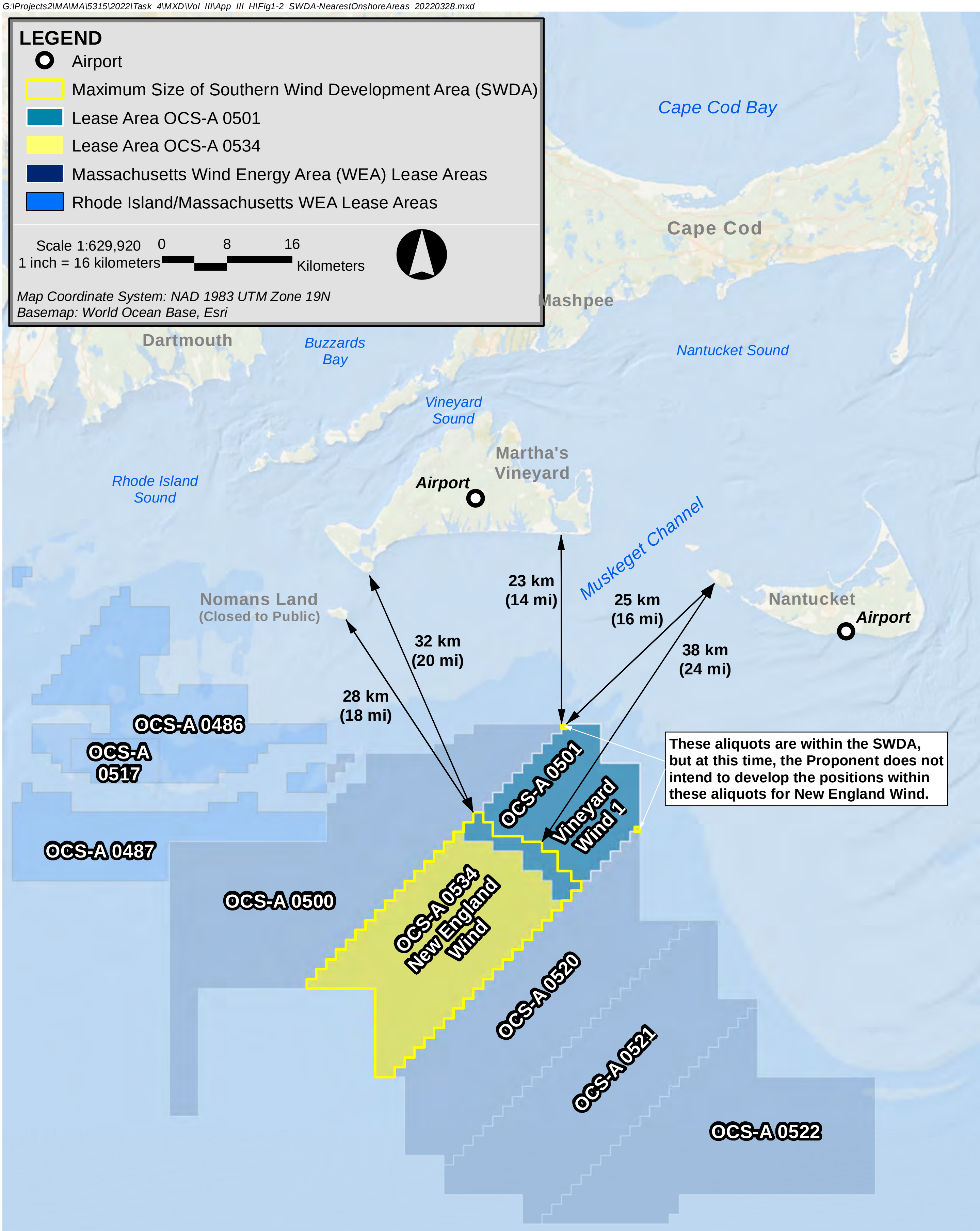


New England Wind
AVANGRID RENEWABLES

**Figure 1.1-2**
*SWDA - Nearest Onshore Areas*

## 1.2 Historic Property Treatment Plan (HPTP) and Section 106 of the National Historic Preservation Act (NHPA)

This Historic Property Treatment Plan (HPTP) will be developed in accordance with the Section 106 and Section 110(f) review (36 CFR 800) of the Undertaking and the forthcoming Memorandum of Agreement (MOA). This HPTP provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation identified during the Section 106 consultation process in the forthcoming Memorandum of Agreement (MOA) with the Bureau of Ocean Energy Management (BOEM), the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation regarding the New England Wind project.

The conditions of COP approval and forthcoming MOA will include measures to avoid and/or minimize adverse effects to identified historic properties, including planned distance of the Undertaking from historic properties, uniform WTG design, speed, height, and rotor diameter to reduce visual contrast, uniform spacing of WTGs to decrease visual clutter, and lighting and marking requirements to minimize visibility. This HPTP addresses the remaining mitigation provisions for the properties identified below.

All activities implemented under this HPTP will be conducted in accordance with the forthcoming conditionals of COP approval and the forthcoming MOA as well as with applicable local, state, and federal regulations and permitting requirements.

## 1.3 Participating Parties

The National Environmental Policy Act (NEPA) substitution process will be utilized by BOEM to fulfill the Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). BOEM hosted the first Section 106-specific meeting with consulting parties on March 3, 2022 and the Proponent 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.

The Proponent is also conducting outreach meetings with various stakeholders to review the findings of the analysis to date and initiate discussion of proposed mitigation measures. These are parties that demonstrated interest in the affected historic property (Participating Parties). The Proponent has conducted and/or anticipates conducting outreach with the following parties:

- The Massachusetts Historical Commission (MHC)
- The Town of Aquinnah
- The Wampanoag Tribe of Gay Head (Aquinnah)
- *[Other Tribes or consulting parties may be added]*

The Proponent further anticipates the above-mentioned parties will participate in the finalization of this draft HPTP through BOEM's Section 106 consultation process. This list may be amended if any additional parties are identified during this process.

## 2.0 SUMMARY OF HISTORIC PROPERTY (EDWIN VANDERHOOP HOMESTEAD AND GAY HEAD – AQUINNAH SHOPS AREA)

*Edwin Vanderhoop Homestead (GAY.40) 35 South Road, Aquinnah, NRIND*

The Edwin Vanderhoop Homestead is individually listed on the National Register (Figure 2.0-1). The late 19th century Edwin Vanderhoop Homestead is a two-and-a-half story Victorian Eclectic style residence. The building's complex plan consists of a rectangular side-gable main block and several intersecting gable roof extensions. The house was constructed for Edwin Vanderhoop, son of William Adriann Vanderhoop, the first member of the family to settle in Gay Head. The Vanderhoops would become important figures in the development of Gay Head. The building is significant under Criteria A and C as an excellent example of a Victorian Eclectic style house and its association with the Vanderhoop family, a prominent local family. The Edwin Vanderhoop Homestead retains integrity of location, design, setting, material, workmanship, feeling, and association.

The Homestead is oriented to take advantage of the ocean view and the seaside setting is integral to its setting. The maritime setting of this resource, and its viewshed, would be altered through the introduction of new elements; however, view from the Homestead toward the SWDA is partially obstructed by topography and mature tree growth to the southeast. View of the SWDA is possible to the south. View of the Homestead to the north and east will be unaffected. View of the Homestead to the south and the west (at an extreme angle) will be affected in ideal weather conditions.

The Homestead is located at the western end of Martha's Vineyard approximately 40.8 km (25.4 mi) from the nearest WTG or ESP. On average, based on airport reported visibilities and accounting for the proposed use of an Aircraft Detection Lighting System (ADLS), visibility from Martha's Vineyard Airport is 16 km (10 mi) or greater 42% of the time in a given year due to weather conditions (see Table 4-1 of Appendix III-H.b). This means that, at minimum, the SWDA will not be visible 58% of the year. In addition to general weather conditions, other factors such as haze and sea spray may further reduce visibility. Photo simulations B-1a to B-1g and C-1a to C-1d in Appendix III-H.a provide representative views of the SWDA.

Eligibility Criterion A would not be affected by the SWDA. Criterion C, as it relates to the setting of the Homestead, would be affected; however, this effect would primarily be the southern view and a portion of the western view. View of the Homestead to the north and east would remain unaffected. While only partial visibility of the SWDA is possible from the Homestead and variable visibility of the SWDA is possible depending upon weather conditions, it is conservatively determined that an adverse effect to the setting of the Homestead may occur.

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services




**Figure 2.0-1**

*Historic Property: Gay Head - Aquinnah Shops Area and Edwin Vanderhoop Homestead*

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*Gay Head – Aquinnah Shops Area (GAY.B) Aquinnah Circle, Aquinnah, NRDIS Eligible*

The Gay Head – Aquinnah Shops Area (the "Shops") is a cluster of nine commercial buildings overlooking the Atlantic Ocean (Figure 2.0-1). Constructed during the early to mid-20th century, the buildings form a U-shaped cluster along the north and south sides of a walkway extending to the Clay Cliffs of Aquinnah Scenic Overlook. The Aquinnah Shops Area is significant under Criteria A and C as a collection of mid-20th century roadside shops associated with the rise of the automobile era and increased tourism at Gay Head Cliffs. These building are part of a group of buildings developed as part of tourism at the Gay Head Cliffs starting in the 19th century with the arrival of steamships. Over time, buildings were developed and then later replaced. The present simple wood shingle gable roofed one to one-and-a-half story buildings are examples of roadside Americana developed in the mid-20th century as car travel became more popular and the buildings are sited to take advantage of the cliffside location as a tourist attraction. Despite some alterations to the buildings, the Gay Head – Aquinnah Shops Area retains integrity of location, setting, material, workmanship, feeling, and association.

The Shops were built to take advantage of the ocean view and the seaside setting is integral to their setting. The Shops located at the western end of Martha's Vineyard are 40.9 km (25.4 mi) from the nearest WTG or ESP. The maritime setting of this resource, and its viewshed, would be altered through the introduction of new elements. However, existing powerlines and other modern elements are already within the foreground of the viewshed as opposed to the SWDA, which will only be partially visible, far off on the horizon. Additionally, existing topography and vegetation partially screen the SWDA from view. Photo simulations B-1a to B-1g and C-1a-C-1d in Appendix III-H.a, which are for a location in proximity to the Gay Head - Aquinnah Shops Area, provide representative views of the SWDA from the Gay Head - Aquinnah Shops Area.

The Shops were constructed as a means of capitalizing on tourism in Gay Head, in particular the Gay Head Cliffs, which are located to the north, west, and south of the Shops. The Gay Head overlook, where tourists view the Cliffs, is located to the north of the Shops and views to the north and east of the Cliffs are the primary viewsheds of the Gay Head Cliffs. A view to the south over the Shops towards the SWDA is possible from the overlook, but is not a significant viewshed as the Shops themselves conflict with the purpose of the overlook, which is to view the natural scenic character of the Cliffs and no view of the Cliffs is possible from this angle. Eligibility Criterion A would not be affected by the SWDA, but Criterion C, as it relates to setting of the Shops, would be affected. The primary viewpoints of the Shops are west or north from Aquinnah Circle; view of the SWDA is not possible with a northern view and the SWDA is only partially visible to the west at an extreme angle. While significant viewsheds will not be altered, it is conservatively determined that an adverse effect may occur.

## 3.0 MITIGATION MEASURES

Mitigation measures for the Edwin Vanderhoop Homestead and the Gay Head - Aquinnah Shops Area are detailed below.

### 3.1 Mitigation Measures

#### *3.1.1 [redacted] TCP Mitigation*

[redacted] TCP. Thus, mitigation measures outlined [redacted] are also applicable to the historic resources listed in this HPTP. The mitigation measures proposed in the [redacted] Mitigation measures are subject to change as consultation is ongoing.

#### *3.1.2 National Register of Historic Places District Nomination for Aquinnah Shops Area*

**Purpose and Intended Outcome**

Specifically for the Aquinnah Shops Area, the Proponent is proposing to draft a National Register of Historic Places District Nomination. The listing of the Aquinnah Shops on the National Register will assist in their preservation by documenting their current condition, acknowledging their historic significance, and potentially allowing for the use of historic tax credits to assist in financing future rehabilitation projects.

**Scope of Work**

The scope of work will be developed in accordance with the Participating Parties and is envisioned to include the documentation of existing conditions and a draft nomination for the National Register of Historic Places.

**Methodology**

The Proponent will prepare an RFP and will consult with Participating Parties in defining objectives and scope of work, as well as in the consultant selection process.

**Standards**

All work will be conducted in accordance with state and federal applicable standards and will be overseen by professionals meeting the qualifications specified in the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61). All work that requires consultation with Tribal Nations will be performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes. Professionals selected shall have demonstrated experience documenting historic places.

**Documentation**

The Proponent will provide the following documentation to the Participating Parties for their review:

- Draft proposed scope of work.
- RFP and consultant bids in response to RFP.
- Draft version of the National Register nomination materials for review and comment by the Participating Parties.
- Final version of the National Register nomination materials.
- Annual progress report to BOEM describing the implementation of the mitigation measures.

**Funds and Accounting**

Funding amounts for this specific mitigation measure 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.

## 3.2 Additional Mitigation Measures

The Proponent is also implementing the following mitigation measures.

### *3.2.1 Uniform Layout and Paint Color Selection*

The Proponent is avoiding and minimizing visual impacts to the maximum extent practicable. The WTGs for each phase will have uniform design, height, and rotor diameter and will be aligned and spaced consistently with other offshore wind facilities, thereby reducing potential for visual clutter. Additionally, the WTGs will be no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey in color in accordance with BOEM and Federal Aviation Administration (FAA) guidance; the Proponent anticipates painting the WTGs off-white/light grey to reduce contrast with the sea and sky and thus, minimize daytime visibility of the WTGs. The conservative threshold for visibility in meteorological analyses is "the greatest distance at which an observer can just see a black object viewed against the horizon sky" (see Section 3.3 of Appendix III-H.a). The Phase 1 and Phase 2 WTGs will not be black; instead, the expected off-white/light grey color will be highly compatible with the hue, saturation, and brightness of the background sky. This lack of contrast between the WTGs and the background means that the percentage of the time the structures might be visible is greatly reduced. Additionally, the upper portion of the ESP(s) will be a grey color which would appear muted and indistinct. Color contrast decreases as distance increases. Color contrast will diminish or disappear completely during periods of haze, fog, or precipitation.

### *3.2.2 Lighting*

Lighting will be kept to the minimum necessary to comply with navigation safety requirements and safe operating conditions. Required marine navigation lights mounted near the top of each WTG/ESP foundation (or on the corners of each ESP) are expected to be visible only to distances of approximately 9.3 km (5 NM). As the closest coastal vantage point is at least 34.1 km (21.2 mi) from the nearest WTG, marine navigation lights will not be visible from shore.

### *3.2.3 Aircraft Detection Lighting Systems (ADLS)*

Subject to BOEM approval, the Proponent also expects to use an ADLS that automatically turns on, and off, aviation obstruction lights in response to the detection of aircraft for the Phase 1 WTGs. For Phase 2, the Proponent would expect to use the same or similar approaches used for Vineyard Wind 1 and/or Phase 1 to reduce lighting, including the use of an ADLS. Based on historical use of the airspace, it is estimated that the aviation obstruction lights on both the nacelle and tower (if needed) will be activated for less than one hour per year (less than 0.1% of the nighttime hours) (see Appendix III-K). The effect of nighttime lighting from the aviation obstruction lights is acknowledged as part of the overall visibility and visual effect of the SWDA; however, the effect of nighttime lighting is substantially minimized through the use of ADLS. As stated previously, meteorological conditions will serve to obscure or block view of the SWDA providing additional minimization of the effect of nighttime lighting. For Phase 1, the onshore export cables to the onshore substation will be primarily installed underground and will typically be within public roadway layouts, although portions of the duct bank may be within existing utility rights-of-way (ROWs). From the onshore substation, grid interconnection cables will also be installed underground. Underground installation of onshore cables is also expected for Phase 2, thus minimizing potential visual effects to adjacent properties.

# 4.0 IMPLEMENTATION

Construction activities of the Undertaking that adversely affect a specific historic property cannot begin until BOEM has accepted the HPTP for that specific adversely affected historic property, consistent with the forthcoming conditions of COP approval. Construction activities that do not adversely affect historic properties may proceed prior to acceptance of the HPTPs.

## 4.1 Timeline

The timeline and organizational responsibilities will be developed in consultation with BOEM and the Participating Parties as the conditions of COP approval and the MOA are developed concurrent with BOEM's National Environmental Policy Act (NEPA) substitution schedule for New England Wind which is currently anticipated to include the following key dates:

- December 2022 – Release of the Draft Environmental Impact Statement (DEIS) followed by a 60-day comment period for the DEIS.
- September 2023 -- Release of Final Environmental Impact Statement (FEIS).
- October 2023 -- NEPA Record of Decision (ROD) issuance.

It is anticipated that the mitigation measures identified in Section 3.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the Participating Parties and accepted by BOEM. Per Section 3.0, the Participating Parties will have a minimum of 45 days to review and comment on all draft reports or other work products developed for this HPTP. The Proponent 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 Participating Parties and accepted by BOEM.

## 4.2 Organizational Responsibilities

### *4.2.1 Bureau of Ocean Energy Management (BOEM)*

- BOEM is responsible for making all federal decisions and determining compliance with Section 106.
- BOEM must review and accept the HPTP before the implementing party may commence any actions.
- BOEM is responsible for consultation related to dispute resolution.
- BOEM in consultation with the Participating Parties will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA.
- BOEM will be responsible for sharing the annual summary report with Participating Parties.

#### *4.2.2 Avangrid Renewables, LLC*

- The Proponent will be responsible for implementing the HPTP.
- The Proponent will be responsible for considering the comments provided by the parties identified.
- Funding the mitigation measures specified in Section 3.0.
- Completion of the scope(s) of work in Section 3.0.
- The Proponent 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.
- Annual reporting to BOEM on implementation of the HPTP.

#### *4.2.3 Participating Parties*

- Participating Parties are responsible for providing feedback on draft scope of work, RFP, and consultant bids within 45 days.
- Participating Parties are responsible for providing feedback on draft materials associated with the National Register Nomination within 45 days.

#### *4.2.4 Other Parties*

The Proponent does not anticipate additional consulting parties; however, should any be determined, this section will be updated.

### 4.3 Participating Party Consultation

The Proponent has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide input on the resolution of adverse effects to, and forms of implementing mitigation, to the Edwin Vanderhoop Homestead and the Gay Head - Aquinnah Shops Area. As part of the development of this draft HPTP, the Proponent will continue to conduct targeted outreach with the Participating Parties identified in Section 1.3. Notification will be sent to BOEM and applicable Participating Parties that the Treatment Plan has been implemented and is complete upon final development of the conditions of COP approval, the forthcoming MOA, and this HPTP.

## 5.0 REFERENCES


[BOEM] Bureau of Ocean Energy Management. 2020. Finding of adverse effect for the Vineyard Wind 1 Project Construction and Operations Plan. Revised November 13, 2020. Retrieved from: https://www.boem.gov/sites/default/files/documents/oil-gas-energy/Vineyard-Wind-Findingof-Adverse-Effect.pdf

DiStefano V, Salzam N. 1980. Cape Poge Light National Register Nomination. Fields J. 2006. Captain William Martin House Form B – Building. Massachusetts Cultural Resources Information System (MACRIS Maps 3.0 Beta) Online mapping program (August 10, 2020). https://maps.mhc-macris.net/.

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ATTACHMENT 6 – HISTORIC PROPERTY TREATMENT PLAN FOR [REDACTED] TCP

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# Draft New England Wind Historic Property Treatment Plan for [redacted] Traditional Cultural Property

*Submitted to:*
BUREAU OF OCEAN ENERGY MANAGEMENT
45600 Woodland Rd
Sterling, VA 20166

*Submitted by:*
Park City Wind LLC

*Prepared by:*
Epsilon Associates Inc.

December 2022

# TABLE OF CONTENTS



## List of Figures

## EXECUTIVE SUMMARY

This draft Historic Property Treatment Plan (HPTP) for the [redacted] Traditional Cultural Property (TCP) adversely affected by New England Wind provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation identified during the Section 106 consultation process in the forthcoming Memorandum of Agreement (MOA) with the Bureau of Ocean Energy Management (BOEM), the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation regarding the New England Wind project. The conditions of Construction and Operations Plan (COP) approval and the forthcoming MOA will identify a substantive baseline of specific mitigation measures to resolve the adverse visual effects to the properties identified below as a result of the construction and operation of New England Wind (the Undertaking) to satisfy requirements of Section 106 and 110(f) of the National Historic Preservation Act (NHPA) of 1966 (54 USC 300101; United States Code, 2016). This HPTP outlines the implementation steps and timeline for actions, and will be consistent with, or equivalent to, those substantive baseline mitigation measures identified in the conditions of COP approval and forthcoming MOA.

The National Environmental Policy Act (NEPA) substitution process will be utilized by BOEM to fulfill the Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). Furthermore, BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use the NEPA substitution process. This draft HPTP has been provided by the Proponent for inclusion in the Draft Environmental Impact Statement (DEIS) for review by BOEM and consulting parties. Meaningful input on the resolution of adverse effects to, and form(s) of implementation at, the historic properties is anticipated.

This draft HPTP includes the mitigation measures proposed by the Proponent for historic properties based on the evaluations and outreach performed by the Proponent prior to the issuance of the DEIS. It is anticipated that the draft HPTP will sustain further revision and refinement as consultation with the Massachusetts State Historic Preservation Officer, the ACHP, and/or other consulting parties through the NEPA substitution process. Should BOEM make a finding of adverse effect for the historic property, the mitigation measure(s) described herein (and in revisions) will be included in the Record of Decision (ROD) and/or 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 draft HPTP. This draft HPTP will be reviewed by, and further developed in, consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule.

This draft HPTP is organized into the following sections:

**Executive Summary**

**Section 1.0 Background Information**

This section outlines the content of this HPTP and provides a description of the proposed development of New England Wind.

**Section 2.0 Summary of Historic Property**

This section summarizes the historic property discussed in this HPTP that may be adversely affected by the Undertaking and summarizes the provisions, attachments, and findings that informed the development of this document, most notably the New England Wind Construction and Operations Plan (NE Wind COP) and the Historic Properties Visual Impact Assessment (Appendix III-H.b).

**Section 3.0 Mitigation Measures**

This section provides a review of mitigation measures proposed by the Proponent as identified in the COP or through consultation with stakeholders. Mitigation measure details may be revised during the consultation process.

**Section 4.0 Implementation**

This section establishes the process for executing the mitigation measures identified in Section 4.0. As the consultation process continues, details for each mitigation measure such as the organizational responsibilities, timeline, and regulatory review requirements will continue to be outlined.

**Section 5.0 References**

This section is a list of works cited for this draft HPTP.

## 1.0 BACKGROUND INFORMATION

### 1.1 Project Overview

New England Wind is the proposal to develop offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and onshore operations and maintenance (O&M) facilities. New England Wind will be developed in two Phases with a maximum of 130 wind turbine generator (WTG) and/or electrical service platform (ESP) positions. Four or five offshore export cables will transmit electricity generated by the WTGs to onshore transmission systems in the Town of Barnstable, Massachusetts. Figure 1.1-1 provides an overview of the New England Wind project. Park City Wind LLC, a wholly owned subsidiary of Avangrid Renewables, LLC, is the Proponent of this Construction and Operations Plan (COP) and will be responsible for the construction, operation, and decommissioning of New England Wind. The construction, operation, and decommissioning of the New England Wind project are defined as the Undertaking and are subject to Section 106 of the National Historic Preservation Act (NHPA).

New England Wind's offshore renewable wind energy facilities are located immediately southwest of Vineyard Wind 1, which is located in Lease Area OCS-A 0501. New England Wind will occupy all of Lease Area OCS-A 0534 and potentially a portion of Lease Area OCS-A 0501 in the event that Vineyard Wind 1 does not develop "spare" or extra positions included in Lease Area OCS-A 0501 and Vineyard Wind 1 assigns those positions to Lease Area OCS-A 0534. For the purposes of the COP, the Southern Wind Development Area (SWDA) is defined as all of Lease Area OCS-A 0534 and the southwest portion of Lease Area OCS-A 0501, as shown in Figure 1.1-1. The SWDA may be approximately 411–453 square kilometers (km2) (101,590– 111,939 acres) in size depending upon the final footprint of Vineyard Wind 1. At this time, the Proponent does not intend to develop the two positions in the separate aliquots located along the northeastern boundary of Lease Area OCS-A 0501 as part of New England Wind. The SWDA (excluding the two separate aliquots closer to shore) is just over 32 kilometers (km) (20 miles [mi]) from the southwest corner of Martha's Vineyard and approximately 38 km (24 mi) from Nantucket (see Figure 1.1-2). Within the SWDA, the closest WTG is approximately 34.1 km (21.2 mi) from Martha's Vineyard and 40.4 km (25.1 mi) from Nantucket. The WTGs and ESP(s) in the SWDA will be oriented in an east-west, north-south grid pattern with one nautical mile (NM) (1.85 km) spacing between positions.

The Historic Properties Visual Impact Assessment (Appendix III-H.b of COP Volume III) for New England Wind is intended to assist BOEM and the Massachusetts Historical Commission (MHC), in its role as the State Historic Preservation Officer (SHPO), in their review of New England Wind under Section 106 of the NHPA and the National Environmental Policy Act. The Preliminary Area of Potential Effects (PAPE) described herein has been developed to assist BOEM and MHC in identifying historic resources listed, or eligible for listing, in the National Register of Historic Places (National Register) in order to assess the potential effects of New England Wind on historic properties.

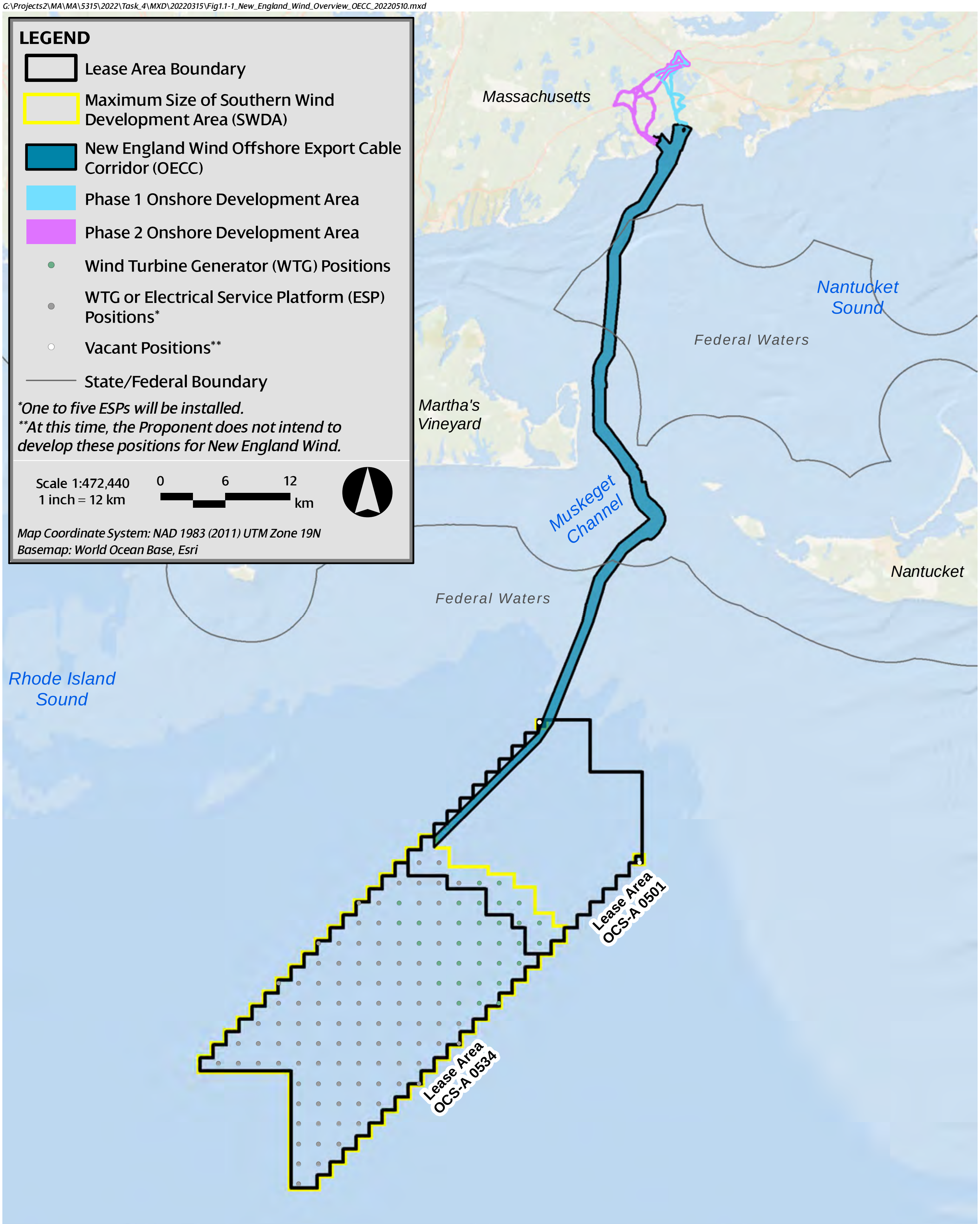




**Figure 1.1-1**
*New England Wind Overview*

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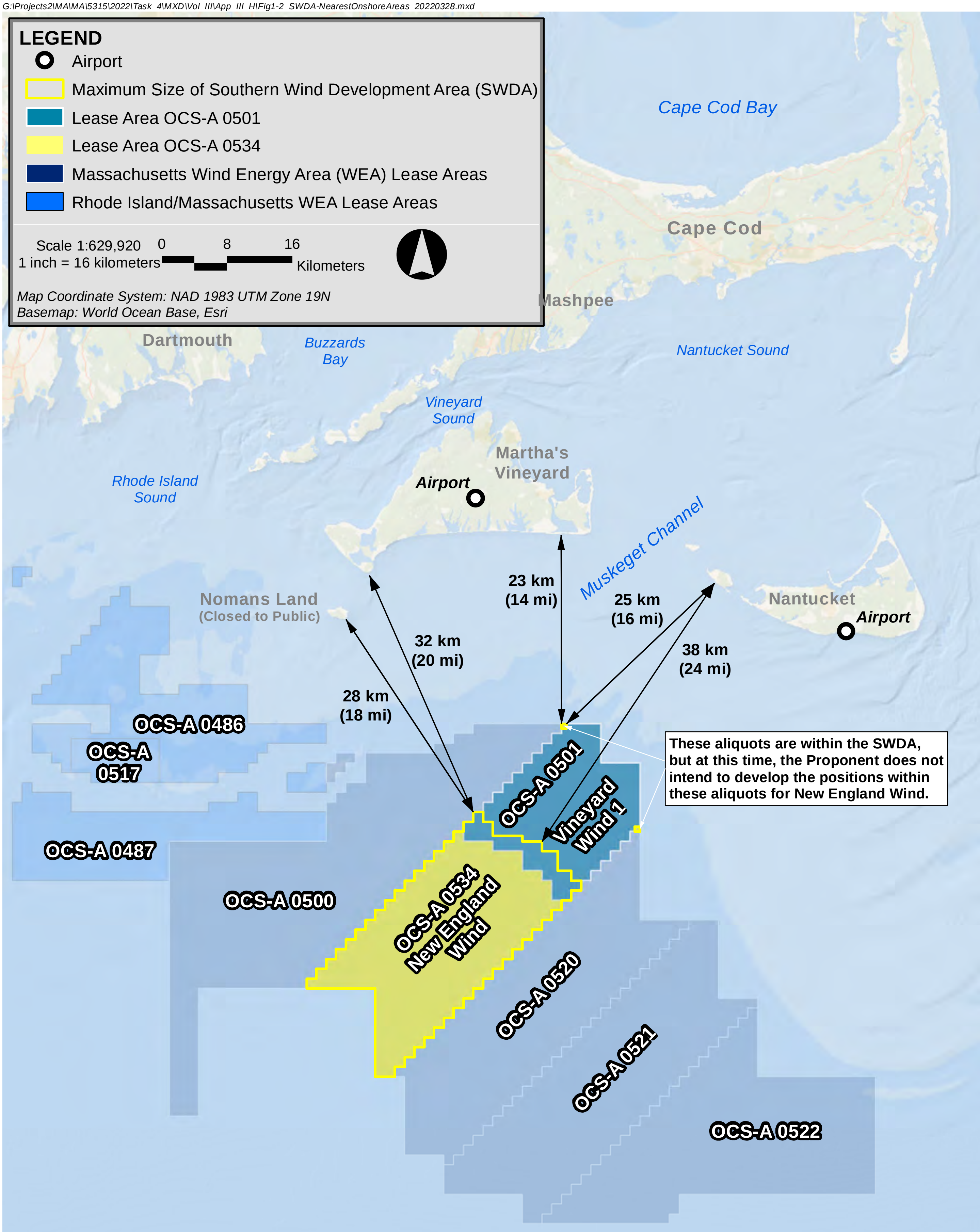




**Figure 1.1-2**
*SWDA - Nearest Onshore Areas*

## 1.2 Historic Property Treatment Plan (HPTP) and Section 106 of the National Historic Preservation Act (NHPA)

This Historic Property Treatment Plan (HPTP) will be developed in accordance with the Section 106 and Section 110(f) review (36 CFR 800) of the Undertaking and the forthcoming Memorandum of Agreement (MOA). This HPTP provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation identified during the Section 106 consultation process in the forthcoming Memorandum of Agreement (MOA) with the Bureau of Ocean Energy Management (BOEM), the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation regarding the New England Wind project.

The conditions of COP approval and forthcoming MOA will include measures to avoid and/or minimize adverse effects to identified historic properties, including planned distance of the Undertaking from historic properties, uniform WTG design, speed, height, and rotor diameter to reduce visual contrast, uniform spacing of WTGs to decrease visual clutter, and lighting and marking requirements to minimize visibility. This HPTP addresses the remaining mitigation provisions for the properties identified below.

All activities implemented under this HPTP will be conducted in accordance with the forthcoming conditionals of COP approval and the forthcoming MOA as well as with applicable local, state, and federal regulations and permitting requirements.

## 1.3 Participating Parties

The National Environmental Policy Act (NEPA) substitution process will be utilized by BOEM to fulfill the Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). BOEM hosted the first Section 106-specific meeting with consulting parties on March 3, 2022 and the Proponent 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.

The Proponent is also conducting outreach meetings with various stakeholders to review the findings of the analysis to date and initiate discussion of proposed mitigation measures. These are parties that demonstrated interest in the affected historic property (Participating Parties). The Proponent has conducted and/or anticipates conducting outreach with the following parties:

- The Massachusetts Historical Commission
- The Chappaquiddick Tribe of Wampanoag Nation
- *[Other Tribes or consulting parties may be added]*

The Proponent further anticipates the above-mentioned parties will participate in the finalization of this draft HPTP through BOEM's Section 106 consultation process. This list may be amended if any additional parties are identified during this process.

# 2.0 SUMMARY OF HISTORIC PROPERTY [redacted] TRADITIONAL CULTURAL PROPERTY)

[redacted] has been determined by BOEM to be potentially eligible for listing on the National Register as a traditional cultural property (TCP; BOEM 2020). [redacted]

[redacted]

The TCP [redacted]

Based upon a review of available historical information on [redacted]

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[redacted]

New England Wind

**Figure 2.0-1**

*Historic Property:* [redacted] *TCP*

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The setting of [redacted] TCP and its viewshed would be minimally altered through the introduction of new elements. [redacted] Additionally, there will be no visual effect from New England Wind's undersea cables. [redacted]

Visibility of the SWDA will be intermittent and only possible during ideal weather conditions as even moderate haze obscures the SWDA from view. Even in ideal weather conditions, the WTGs will be barely distinguishable at the horizon line. Without foreknowledge of New England Wind, it would likely not be possible for an observer to understand what is visible as the WTGs appear as cloud shadows or other atmospheric phenomena. While significant viewsheds will not be altered, it is conservatively determined that an adverse effect may occur.

## 3.0 MITIGATION MEASURES

Mitigation measures for the [redacted] TCP are detailed below.

### 3.1 Survey and GIS Database of Contributing Resources to the TCP

**Purpose and Intended Outcome**

Physical features associated with, and contributing resources to, the TCP will be identified and organized into a non-proprietary spatial database to assist in prioritizing preservation efforts and as a public education product. This information shall be publicly accessible and therefore will not include locations of areas of archaeological sensitivity or locations of areas of religious or cultural sensitivity to Tribal Nations.

**Scope of Work**

The scope of work will be developed in accordance with the Participating Parties and is envisioned to include conducting a photographic survey of contributing features to the National Register eligible [redacted] TCP (both those previously identified and yet to be determined) and developing a GIS database of Contributing Resources to the TCP. As part of this mitigation measure, the Proponent will work with the Participating Parties to identify publicly available contributing resources. [redacted]; through the proposed survey, additional contributing properties may be identified.

The development of the GIS database will include drafting a preliminary platform, proposed interfaces, and database structure that accommodates the agreed upon narrative descriptions and characteristics requested to be documented. Examples of data layers could include:

- existing conditions
- identifying sites at risk due to coastal erosion, storm surge, or habitat degradation
- resources that provide contextual value

Up to 20 sites will be identified through the survey, though it is noted some may be excluded due to sensitivity concerns. Contributing properties identified shall be documented on appropriate Massachusetts Historical Commission (MHC) survey forms.

**Methodology**

The Proponent will prepare an RFP, in consultation with Participating Parties, and in accordance with National Register Bulletins #30 (Rural Historic Landscapes) and #38 (Traditional Cultural Properties). Participating Parties will be consulted in defining objectives and scope of work, as well as in the consultant selection process. The field investigation and photographic survey will identify locations and features that contribute to the historic character [redacted] TCP including natural landscape areas of historic activities (hunting, fishing, settlement areas) as well as historic buildings and structures, where applicable. The survey will include historical and archaeological background research on the history of [redacted]. The background research will assist in identifying areas of historic significance and provide information for the public education portion of the project. (No archaeological field excavations are proposed as part of this mitigation measure.)

**Standards**

All work will be conducted in accordance with applicable standards and will be overseen by professionals meeting the qualifications specified in the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61). All work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes. The GIS work will be developed by professionals with demonstrated experience and will be overseen by a qualified Geographic Information Systems Professional. Professionals selected shall have demonstrated experience documenting Traditional Cultural Properties per National Register Bulletin #38 and Rural Historic Landscapes per National Register Bulletin #30.

**Documentation**

The Proponent will provide the following documentation to the Participating Parties for their review:

- Draft proposed scope of work.
- RFP and consultant bids in response to RFP.
- MHC survey forms for contributing properties.
- Draft version of the GIS database.
- Final version of the GIS database.
- Annual progress report to BOEM describing the implementation of the mitigation measures.

**Funds and Accounting**

Funding amounts for this specific mitigation measure 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.

## 3.2 Development of Interpretative Materials

**Purpose and Intended Outcome**

The Proponent will develop and incorporate other digital media pertaining to the physical and cultural elements of the historic property in a manner that enhances intratribal and extra-tribal appreciation in conjunction with the GIS database described above. ArcGIS story maps or comparable presentations could include relevant publicly available archival data, oral histories, news stories, video footage, and public domain datasets.

**Scope of Work**

The scope of work will be developed in accordance with the Participating Parties and is envisioned to include a plan for developing interpretative material including the following:

- Hosting a meeting with Participating Parties to review the selected contributing features to the National Register eligible [redacted] TCP;
- Preparing and presenting a draft ArcGIS StoryMap (which would include a viewing of the end user's perspective); and
- Developing an introduction and providing training on how the digital media platform functions for the Participating Parties.

The scope of work will also include soliciting feedback during the meeting and agreeing to a schedule for incorporating comments and presenting a final product.

**Methodology**

The Proponent will prepare an RFP and will consult with Participating Parties in defining objectives and scope of work, as well as in the consultant selection process.

**Standards**

All work will be conducted in accordance with state and federal applicable standards and will be overseen by professionals meeting the qualifications specified in the Secretary of the *Interior's Professional Qualifications Standards* (36 CFR Part 61). All work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

**Documentation**

The Proponent will provide the following documentation to the Participating Parties for their review:

- Draft proposed scope of work.
- RFP and consultant bids in response to RFPs.
- A draft version of the interpretative materials.
- A final version of the interpretative materials. Annual progress report to BOEM describing the implementation of the mitigation measures.

**Funds and Accounting**

Funding amounts for this specific mitigation measure 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

## 3.3 Additional Mitigation Measures

The Proponent is also implementing the following mitigation measures.

### *3.3.1 Uniform Layout and Paint Color Selection*

The Proponent is avoiding and minimizing visual impacts to the maximum extent practicable. The WTGs for each phase will have uniform design, height, and rotor diameter and will be aligned and spaced consistently with other offshore wind facilities, thereby reducing potential for visual clutter. Additionally, the WTGs will be no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey in color in accordance with BOEM and Federal Aviation Administration (FAA) guidance; the Proponent anticipates painting the WTGs off-white/light grey to reduce contrast with the sea and sky and thus, minimize daytime visibility of the WTGs. The conservative threshold for visibility in meteorological analyses is "the greatest distance at which an observer can just see a black object viewed against the horizon sky" (see Section 3.3 of Appendix III-H.a). The Phase 1 and Phase 2 WTGs will not be black; instead, the expected off-white/light grey color will be highly compatible with the hue, saturation, and brightness of the background sky. This lack of contrast between the WTGs and the background means that the percentage of the time the structures might be visible is greatly reduced. Additionally, the upper portion of the ESP(s) will be a grey color which would appear muted and indistinct. Color contrast decreases as distance increases. Color contrast will diminish or disappear completely during periods of haze, fog, or precipitation.

### *3.3.2 Lighting*

Lighting will be kept to the minimum necessary to comply with navigation safety requirements and safe operating conditions. Required marine navigation lights mounted near the top of each WTG/ESP foundation (or on the corners of each ESP) are expected to be visible only to distances of approximately 9.3 km (5 NM). As the closest coastal vantage point is at least 34.1 km (21.2 mi) from the nearest WTG, marine navigation lights will not be visible from shore.

### *3.3.3 Aircraft Detection Lighting Systems (ADLS)*

Subject to BOEM approval, the Proponent also expects to use an Aircraft Detection Lighting System (ADLS) that automatically turns on, and off, aviation obstruction lights in response to the detection of aircraft for the Phase 1 WTGs. For Phase 2, the Proponent would expect to use the same or similar approaches used for Vineyard Wind 1 and/or Phase 1 to reduce lighting, including the use of an ADLS. Based on historical use of the airspace, it is estimated that the aviation obstruction lights on both the nacelle and tower (if needed) will be activated for less than one hour per year (less than 0.1% of the nighttime hours) (see Appendix III-K). The effect of nighttime lighting from the aviation obstruction lights is acknowledged as part of the overall visibility and visual effect of the SWDA; however, the effect of nighttime lighting is substantially minimized through the use of ADLS. As stated previously, meteorological conditions will serve to obscure or block view of the SWDA providing additional minimization of the effect of nighttime lighting. For Phase 1, the onshore export cables to the onshore substation will be primarily installed underground and will typically be within public roadway layouts, although portions of the duct bank may be within existing utility rights-of-way (ROWs). From the onshore substation, grid interconnection cables will also be installed underground. Underground installation of onshore cables is also expected for Phase 2, thus minimizing potential visual effects to adjacent properties.

# 4.0 IMPLEMENTATION

Construction activities of the Undertaking that adversely affect a specific historic property cannot begin until BOEM has accepted the HPTP for that specific adversely affected historic property, consistent with the forthcoming conditions of COP approval. Construction activities that do not adversely affect historic properties may proceed prior to acceptance of the HPTPs.

## 4.1 Timeline

The timeline and organizational responsibilities will be developed in consultation with BOEM and the Participating Parties as the conditions of COP approval and the MOA are developed concurrent with BOEM's National Environmental Policy Act (NEPA) substitution schedule for New England Wind which is currently anticipated to include the following key dates:

- December 2022 – Release of the Draft Environmental Impact Statement (DEIS) followed by a 60-day public comment period for the DEIS.
- September 2023 -- Release of Final Environmental Impact Statement (FEIS).
- October 2023 -- NEPA Record of Decision (ROD) issuance.

It is anticipated that the mitigation measure identified in Section 3.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the Participating Parties and accepted by BOEM. Per Section 3.0, the Participating Parties will have a minimum of 45 days to review and comment on all draft reports or other work products developed for this HPTP. The Proponent 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.

## 4.2 Organizational Responsibilities

### *4.2.1 Bureau of Ocean Energy Management (BOEM)*

- BOEM is responsible for making all federal decisions and determining compliance with Section 106.
- BOEM must review and accept the HPTP before the implementing party may commence any actions.
- BOEM is responsible for consultation related to dispute resolution.
- BOEM in consultation with the Participating Parties will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA.
- BOEM will be responsible for sharing the annual summary report with Participating Parties.

### *4.2.2 Avangrid Renewables, LLC*

- The Proponent will be responsible for implementing the HPTP.
- The Proponent will be responsible for considering the comments provided by the parties identified.
- Annual reporting to BOEM on implementation of the HPTP.
- Funding the mitigation measures specified in Section 3.0.
- Completion of the scope(s) of work in Section 3.0.
- Ensuring all Standards in Section 3.0 are met.
- Providing the Documentation in Section 3.0 to the Participating Parties for review and comment.
- The Proponent 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.

### *4.2.3 Participating Parties*

- Identify resources of significance to support GIS database development mitigation measure (if selected).
- Provide feedback on draft scope of work, RFP, and consultant bids within 45 days.
- Provide feedback on draft materials within 45 days.

### *4.2.4 Other Parties*

The Proponent does not anticipate additional consulting parties; however, should any be determined, this will be updated.

## 4.3 Participating Party Consultation

The Proponent has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide input on the resolution of adverse effects to, and forms of implementing mitigation, to [redacted] TCP. As part of the development of this draft HPTP, the Proponent will continue to conduct targeted outreach with the Participating Parties identified in Section 1.3. Notification will be sent to BOEM and applicable Participating Parties that the Treatment Plan has been implemented and is complete upon final development of the conditions of COP approval, the forthcoming MOA, and this HPTP.

## 5.0 REFERENCES

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ATTACHMENT 7 – HISTORIC PROPERTY TREATMENT PLAN FOR GAY HEAD LIGHTHOUSE

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New England Wind
AVANGRID

# Draft New England Wind Historic Property Treatment Plan for the Gay Head Lighthouse

*Submitted to:*
BUREAU OF OCEAN ENERGY MANAGEMENT
45600 Woodland Rd
Sterling, VA 20166

*Submitted by:*
Park City Wind LLC

*Prepared by:*
Epsilon
ASSOCIATES INC.

December 2022

# TABLE OF CONTENTS



## List of Figures

## EXECUTIVE SUMMARY

This draft Historic Property Treatment Plan (HPTP) for the Gay Head Lighthouse adversely affected by New England Wind provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation identified during the Section 106 consultation process in the forthcoming Memorandum of Agreement (MOA) with the Bureau of Ocean Energy Management (BOEM), the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation regarding the New England Wind project. The conditions of Construction and Operations Plan (COP) approval and the forthcoming MOA will identify a substantive baseline of specific mitigation measures to resolve the adverse visual effects to the properties identified below as a result of the construction and operation of New England Wind (the Undertaking) to satisfy requirements of Section 106 and 110(f) of the National Historic Preservation Act (NHPA) of 1966 (54 USC 300101; United States Code, 2016). This HPTP outlines the implementation steps and timeline for actions, and will be consistent with, or equivalent to, those substantive baseline mitigation measures identified in the conditions of COP approval and forthcoming MOA.

The National Environmental Policy Act (NEPA) substitution process will be utilized by BOEM to fulfill the Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). Furthermore, BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use the NEPA substitution process. This draft HPTP has been provided by the Proponent for inclusion in the Draft Environmental Impact Statement (DEIS) for review by BOEM and consulting parties. Meaningful input on the resolution of adverse effects to, and form(s) of implementation at, the historic properties is anticipated.

This draft HPTP includes the mitigation measures proposed by the Proponent for historic properties based on the evaluations and outreach performed by the Proponent prior to the issuance of the DEIS. It is anticipated that the draft HPTP will sustain further revision and refinement as consultation with the Massachusetts State Historic Preservation Officer, the ACHP, and/or other consulting parties through the NEPA substitution process. Should BOEM make a finding of adverse effect for the historic property, the mitigation measure(s) described herein (and in revisions) will be included in the Record of Decision (ROD) and/or 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 draft HPTP. This draft HPTP will be reviewed by, and further developed in, consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule.

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This section outlines the content of this HPTP and provides a description of the proposed development of New England Wind.

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**Section 3.0 Mitigation Measures**

This section provides a review of mitigation measures proposed by the Proponent as identified in the COP or through consultation with stakeholders. Mitigation measure details may be revised during the consultation process.

**Section 4.0 Implementation**

This section establishes the process for executing the mitigation measures identified in Section 4.0. As the consultation process continues, details for each mitigation measure such as the organizational responsibilities, timeline, and regulatory review requirements will continue to be outlined.

**Section 5.0 References**

This section is a list of works cited for this draft HPTP.

# 1.0 BACKGROUND INFORMATION

## 1.1 Project Overview

New England Wind is the proposal to develop offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and onshore operations and maintenance (O&M) facilities. New England Wind will be developed in two Phases with a maximum of 130 wind turbine generator (WTG) and/or electrical service platform (ESP) positions. Four or five offshore export cables will transmit electricity generated by the WTGs to onshore transmission systems in the Town of Barnstable, Massachusetts. Figure 1.1-1 provides an overview of the New England Wind project. Park City Wind LLC, a wholly owned subsidiary of Avangrid Renewables, LLC, is the Proponent of this Construction and Operations Plan (COP) and will be responsible for the construction, operation, and decommissioning of New England Wind. The construction, operation, and decommissioning of the New England Wind project are defined as the Undertaking and are subject to Section 106 of the National Historic Preservation Act (NHPA).

New England Wind's offshore renewable wind energy facilities are located immediately southwest of Vineyard Wind 1, which is located in Lease Area OCS-A 0501. New England Wind will occupy all of Lease Area OCS-A 0534 and potentially a portion of Lease Area OCS-A 0501 in the event that Vineyard Wind 1 does not develop "spare" or extra positions included in Lease Area OCS-A 0501 and Vineyard Wind 1 assigns those positions to Lease Area OCS-A 0534. For the purposes of the COP, the Southern Wind Development Area (SWDA) is defined as all of Lease Area OCS-A 0534 and the southwest portion of Lease Area OCS-A 0501, as shown in Figure 1.1-1. The SWDA may be approximately 411–453 square kilometers (km2) (101,590– 111,939 acres) in size depending upon the final footprint of Vineyard Wind 1. At this time, the Proponent does not intend to develop the two positions in the separate aliquots located along the northeastern boundary of Lease Area OCS-A 0501 as part of New England Wind. The SWDA (excluding the two separate aliquots closer to shore) is just over 32 kilometers (km) (20 miles [mi]) from the southwest corner of Martha's Vineyard and approximately 38 km (24 mi) from Nantucket (see Figure 1.1-2). Within the SWDA, the closest WTG is approximately 34.1 km (21.2 mi) from Martha's Vineyard and 40.4 km (25.1 mi) from Nantucket. The WTGs and ESP(s) in the SWDA will be oriented in an east-west, north-south grid pattern with one nautical mile (NM) (1.85 km) spacing between positions.

The Historic Properties Visual Impact Assessment (Appendix III-H.b of COP Volume III) for New England Wind is intended to assist BOEM and the Massachusetts Historical Commission (MHC), in its role as the State Historic Preservation Officer (SHPO), in their review of New England Wind under Section 106 of the NHPA and the National Environmental Policy Act. The Preliminary Area of Potential Effects (PAPE) described herein has been developed to assist BOEM and MHC in identifying historic resources listed, or eligible for listing, in the National Register of Historic Places (National Register) in order to assess the potential effects of New England Wind on historic properties.

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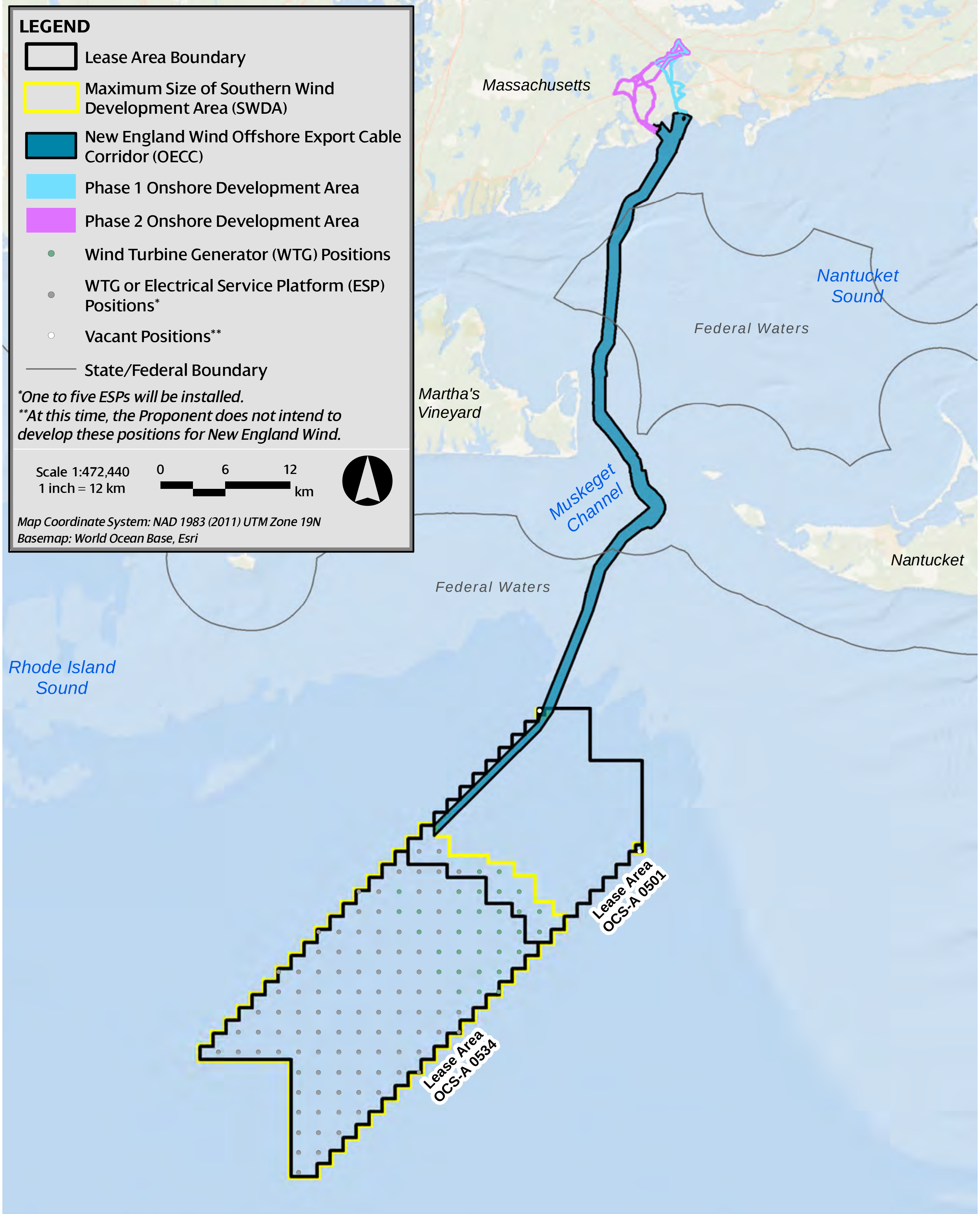





**Figure 1.1-1**
*New England Wind Overview*

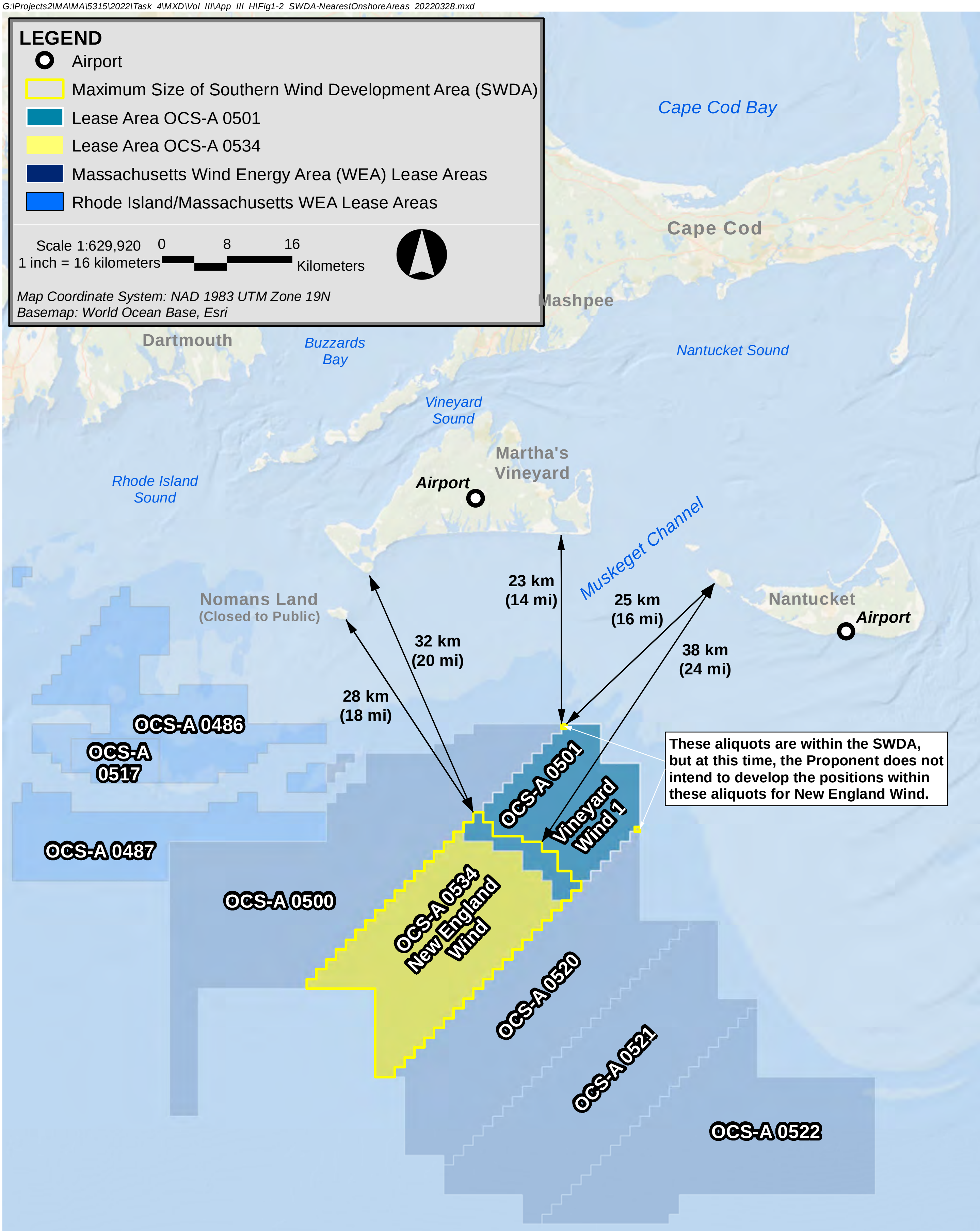





**Figure 1.1-2**
*SWDA - Nearest Onshore Areas*

## 1.2 Historic Property Treatment Plan (HPTP) and Section 106 of the National Historic Preservation Act (NHPA)

This Historic Property Treatment Plan (HPTP) will be developed in accordance with the Section 106 and Section 110(f) review (36 CFR 800) of the Undertaking and the forthcoming Memorandum of Agreement (MOA). This HPTP provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation identified during the Section 106 consultation process in the forthcoming Memorandum of Agreement (MOA) with the Bureau of Ocean Energy Management (BOEM), the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation regarding the New England Wind project.

The conditions of COP approval and forthcoming MOA will include measures to avoid and/or minimize adverse effects to identified historic properties, including planned distance of the Undertaking from historic properties, uniform WTG design, speed, height, and rotor diameter to reduce visual contrast, uniform spacing of WTGs to decrease visual clutter, and lighting and marking requirements to minimize visibility. This HPTP addresses the remaining mitigation provisions for the properties identified below.

All activities implemented under this HPTP will be conducted in accordance with the forthcoming conditionals of COP approval and the forthcoming MOA as well as with applicable local, state, and federal regulations and permitting requirements.

### *1.2.1 Municipal Regulations*

Consistent with the forthcoming conditions of COP approval and MOA, 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.

### *1.2.2 Preservation Easements and Restrictions*

Any implementation of treatment plans will be in accordance with approvals through preservation restrictions where applicable.

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. See Section 3.0 for additional information.

## 1.3 Participating Parties

The National Environmental Policy Act (NEPA) substitution process will be utilized by BOEM to fulfill the Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). BOEM hosted the first Section 106-specific meeting with consulting parties on March 3, 2022 and the Proponent 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.

The Proponent is also conducting outreach meetings with various stakeholders to review the findings of the analysis to date and initiate discussion of proposed mitigation measures. These are parties that demonstrated interest in the affected historic property (Participating Parties). The Proponent has conducted and/or anticipates conducting outreach with the following parties:

- The Massachusetts Historical Commission
- The Town of Aquinnah
- The Gay Head Lighthouse Advisory Committee
- The Wampanoag Tribe of Gay Head (Aquinnah)
- The United States Coast Guard (USCG) (if necessary)
- *[Other Tribes or consulting parties may be added]*

The Proponent further anticipates the above-mentioned parties will participate in the finalization of this draft HPTP through BOEM's Section 106 consultation process. This list may be amended if any additional parties are identified during this process.

## 2.0 SUMMARY OF HISTORIC PROPERTY (GAY HEAD LIGHTHOUSE)

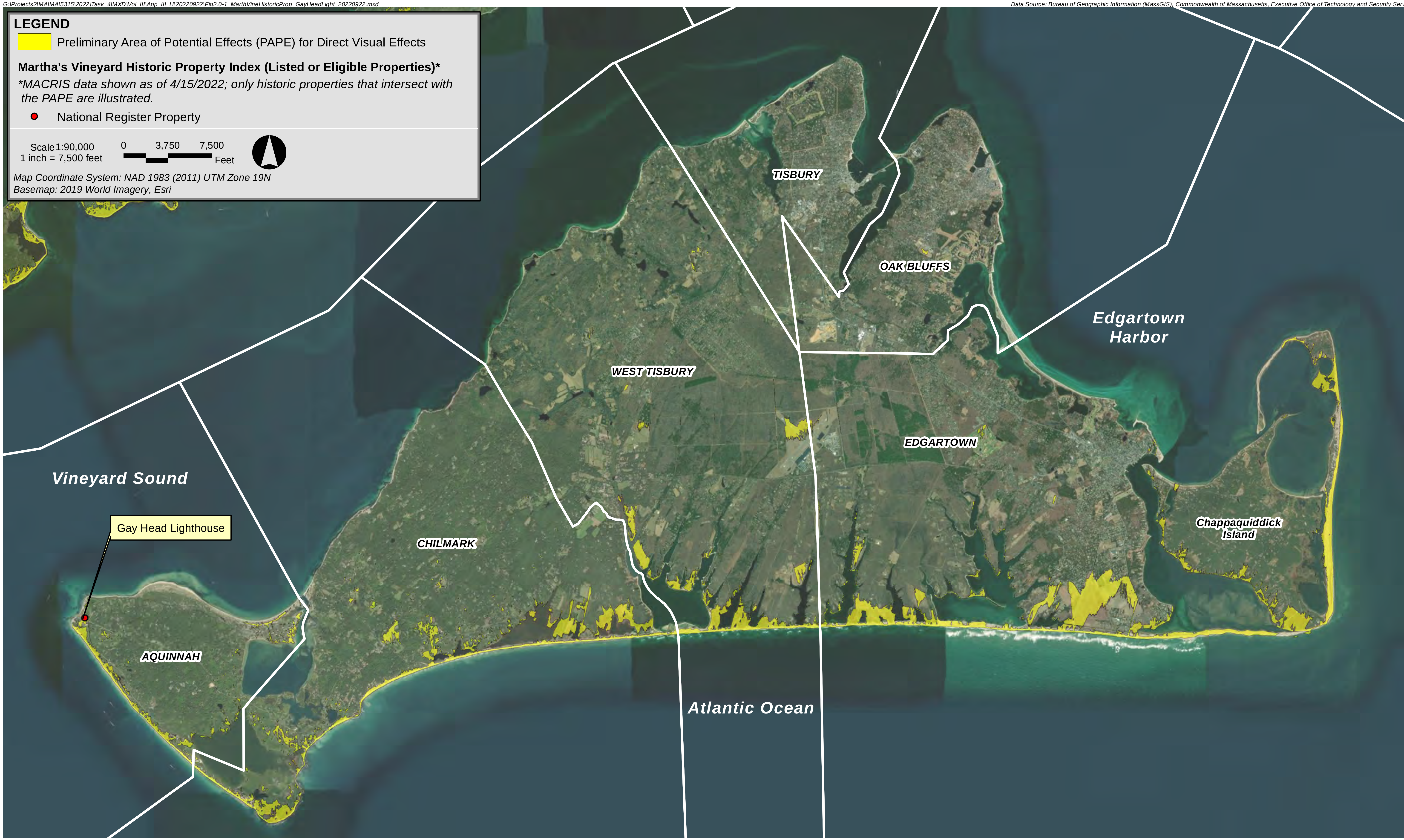
The Gay Head Lighthouse, which is located on the southwestern-most portion of Martha's Vineyard (Figure 2.0-1), is listed on the National Register and is significant under Criteria A and C as a historic maritime structure and aid to navigation. Constructed in 1855–1856, the Gay Head Lighthouse was once one of the 10 most important lights on the Atlantic Coast and originally contained one of the country's first Fresnel lenses. The 14 m (45 ft) tall brick and sandstone tower meets Criterion A for its association with the island's maritime history as an aid to navigation. The structure also meets Criterion C as an example of a 19th century maritime structure. Although the Gay Head Lighthouse was moved from its original location 45.7 m (150 ft) east in 2015 and its setting and location are partially compromised, the structure retains integrity of design, material, workmanship, feeling, and association.

As a lighthouse, an ocean view toward the horizon is integral to its character and setting as well as its historic function. The maritime setting of this resource, and its viewshed, would be adversely affected through the introduction of new elements. The construction of the WTGs/ESP(s) would alter the experience of an observer of the lighthouse when the SWDA is visible. Views in the southern/southeastern direction would be affected; views toward the north, east, and west would not be affected.

Gay Head Lighthouse is 41.0 km (25.5 mi) from the nearest WTG or ESP. Photo simulations B-1a to B-1g and C-1a to C-1d in Appendix III-H.a, which are for a location in proximity to the Gay Head Lighthouse (the Aquinnah Cultural Center), provide representative views of the SWDA from the Gay Head Lighthouse. As described further in Section 4.2 of Appendix III-H.b, based on the methodology in BOEM 2017-037, and taking into account the proposed use of an ADLS, on average for all conditions, New England Wind's WTGs/ESP(s) could be visible 18% of the time from the Gay Head Lighthouse (see Table 4-2 of Appendix III-H.b). In addition to general weather conditions, other factors such as haze and sea spray may further reduce visibility.

Gay Head Lighthouse is located 45.7 m (150 ft) from its original location and is surrounded by a modern stone wall and fence. Although the structure has been moved from its original location (which has partially compromised its setting) and the SWDA is only partially visible from Gay Head Lighthouse (depending on and meteorological conditions), New England Wind introduces visual elements that are out of character with the historic setting, feeling, and association of the property. Therefore, eligibility Criterion A and Criterion C (as it relates to the setting of Gay Head Lighthouse and its clear horizon view) would be adversely affected by New England Wind. However, it should be noted that the adverse effect is inconsistent and weather dependent; for the vast majority of the time, the SWDA will not be visible.

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services




New England Wind

AVANGRID RENEWABLES

**Figure 2.0-1**

*Historic Property: Gay Head Lighthouse*

# 3.0 MITIGATION MEASURES

Mitigation measures for the Gay Head Lighthouse are detailed below.

## 3.1 Ongoing Maintenance of the Lighthouse

**Purpose and Intended Outcome**

Based on multiple meetings conducted between the Proponent and representatives from the Gay Head Lighthouse Advisory Committee, the Proponent proposes to assist with ongoing repair and maintenance of the Gay Head Lighthouse through the provision of funds for ongoing maintenance work. The Proponent understands that support for such ongoing maintenance work is a priority for the Gay Head Lighthouse Advisory Committee and is required by existing agreements with MHC and the USCG.

**Scope of Work**

The Proponent has met with the Gay Head Lighthouse Advisory Committee on multiple occasions to identify and prioritize maintenance tasks. The Gay Head Lighthouse Advisory Committee expects that ongoing maintenance work will primarily consist of the following tasks:

- Painting (interior and exterior) and power washing of the structures, typically done every other year. Painting activities are expected to involve maintenance of existing conditions only; no changes in paint color are anticipated.
- Annual maintenance of the grounds and turf to preserve safe conditions for public use and to prevent water infiltration, erosion and washout that could inhibit public access and/or result in damage the lighthouse foundation and Gay Head Cliffs. Maintenance of the turf is also part of an existing agreement between the Gay Head Lighthouse Advisory Committee and the USCG.
- Repairing and maintaining pathways for public circulation, including maintaining an existing Americans with Disabilities Act (ADA) compliant pathway.
- Minor repairs due to public use and general wear and tear, such as replacing or repairing electrical outlets, railings, plaster, and/or fencing.

Written documentation of the existing conditions will be provided, as well as summary of activities completed.

**Methodology**

This work will build off the mitigation work approved during the federal review of the Vineyard Wind 1 project. The Gay Head Lighthouse Advisory Committee will implement the ongoing maintenance and will hire an outside consultant when needed.

**Standards**

All work will be conducted in accordance with applicable standards. Examples of standards that may be applicable include:

- 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.

**Documentation**

The Proponent will provide the following documentation to the Participating Parties for their review:

- Draft proposed list of anticipated maintenance tasks and a written agreement outlining the appropriate scope, standards, documentation, and decision-making for any potential additional maintenance activities not included in the list of anticipated maintenance tasks.
- Final list of anticipated maintenance tasks and a written agreement outlining the appropriate scope, standards, documentation, and decision-making for any potential additional maintenance activities not included in the list of anticipated maintenance tasks.
- Description of proposed funding mechanism.
- Annual progress report to BOEM describing the implementation of the mitigation measures.

**Funds and Accounting**

Funding amounts for this specific mitigation measure 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. At present, it is envisioned that the Proponent will establish an escrow account through a one-time payment; the escrow account will be available to the Gay Head Lighthouse Advisory Committee to withdraw funds from for annual maintenance activities over the life of the lease.

## 3.2 Additional Mitigation Measures

The Proponent is also implementing the following mitigation measures.

### *3.2.1 Uniform Layout and Paint Color Selection*

The Proponent is avoiding and minimizing visual impacts to the maximum extent practicable. The WTGs for each phase will have uniform design, height, and rotor diameter and will be aligned and spaced consistently with other offshore wind facilities, thereby reducing potential for visual clutter. Additionally, the WTGs will be no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey in color in accordance with BOEM and Federal Aviation Administration (FAA) guidance; the Proponent anticipates painting the WTGs off-white/light grey to reduce contrast with the sea and sky and thus, minimize daytime visibility of the WTGs. The conservative threshold for visibility in meteorological analyses is "the greatest distance at which an observer can just see a black object viewed against the horizon sky" (see Section 3.3 of Appendix III-H.a). The Phase 1 and Phase 2 WTGs will not be black; instead, the expected off-white/light grey color will be highly compatible with the hue, saturation, and brightness of the background sky. This lack of contrast between the WTGs and the background means that the percentage of the time the structures might be visible is greatly reduced. Additionally, the upper portion of the ESP(s) will be a grey color which would appear muted and indistinct. Color contrast decreases as distance increases. Color contrast will diminish or disappear completely during periods of haze, fog, or precipitation.

### *3.2.2 Lighting*

Lighting will be kept to the minimum necessary to comply with navigation safety requirements and safe operating conditions. Required marine navigation lights mounted near the top of each WTG/ESP foundation (or on the corners of each ESP) are expected to be visible only to distances of approximately 9.3 km (5 NM). As the closest coastal vantage point is at least 34.1 km (21.2 mi) from the nearest WTG, marine navigation lights will not be visible from shore.

### *3.2.3 Aircraft Detection Lighting Systems (ADLS)*

Subject to BOEM approval, the Proponent also expects to use an Aircraft Detection Lighting System (ADLS) that automatically turns on, and off, aviation obstruction lights in response to the detection of aircraft for the Phase 1 WTGs. For Phase 2, the Proponent would expect to use the same or similar approaches used for Vineyard Wind 1 and/or Phase 1 to reduce lighting, including the use of an ADLS. Based on historical use of the airspace, it is estimated that the aviation obstruction lights on both the nacelle and tower (if needed) will be activated for less than one hour per year (less than 0.1% of the nighttime hours) (see Appendix III-K). The effect of nighttime lighting from the aviation obstruction lights is acknowledged as part of the overall visibility and visual effect of the SWDA; however, the effect of nighttime lighting is substantially minimized through the use of ADLS. As stated previously, meteorological conditions will serve to obscure or block view of the SWDA providing additional minimization of the effect of nighttime lighting. For Phase 1, the onshore export cables to the onshore substation will be primarily installed underground and will typically be within public roadway layouts, although portions of the duct bank may be within existing utility rights-of-way (ROWs). From the onshore substation, grid interconnection cables will also be installed underground. Underground installation of onshore cables is also expected for Phase 2, thus minimizing potential visual effects to adjacent properties.

## 4.0 IMPLEMENTATION

Construction activities of the Undertaking that adversely affect a specific historic property cannot begin until BOEM has accepted the HPTP for that specific adversely affected historic property, consistent with the forthcoming conditions of COP approval. Construction activities that do not adversely affect historic properties may proceed prior to acceptance of the HPTPs.

### 4.1 Timeline

The timeline and organizational responsibilities will be developed in consultation with BOEM and the Participating Parties as the conditions of COP approval and the MOA are developed concurrent with BOEM's National Environmental Policy Act (NEPA) substitution schedule for New England Wind which is currently anticipated to include the following key dates:

- December 2022 – Release of the Draft Environmental Impact Statement (DEIS) followed by a 60-day comment period for the DEIS.
- September 2023 -- Release of Final Environmental Impact Statement (FEIS).
- October 2023 -- NEPA Record of Decision (ROD) issuance.

It is anticipated that the mitigation measures identified in Section 3.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the Participating Parties and accepted by BOEM. Per Section 3.0, the Participating Parties will have a minimum of 45 days to review and comment on all draft work products developed for this HPTP. The Proponent 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 Participating Parties and accepted by BOEM. Specific to the ongoing maintenance activities described in Section 3.1, the Proponent anticipates that the proposed funding mechanism for these maintenance activities will be established at financial close unless a different timeline is agreed upon by the Proponent and Participating Parties and accepted by BOEM.

### 4.2 Organizational Responsibilities

#### *4.2.1 Bureau of Ocean Energy Management (BOEM)*

- BOEM is responsible for making all federal decisions and determining compliance with Section 106.
- BOEM must review and accept the HPTP before the implementing party may commence any actions.
- BOEM is responsible for consultation related to dispute resolution.
- BOEM in consultation with the Participating Parties will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA.
- BOEM will be responsible for sharing the annual summary report with Participating Parties.

#### *4.2.2 Avangrid Renewables, LLC*

- The Proponent will be responsible for funding the Ongoing Maintenance of the Lighthouse (see Section 3.1) and for implementing the additional mitigation measures (see Section 3.2).
- The Proponent will be responsible for considering the comments provided by the parties identified.
- Annual reporting to BOEM on implementation of the HPTP.
- Funding the mitigation measures specified in Section 3.0.
- Completion of the scope(s) of work in Section 3.2.
- Providing the Documentation in Section 3.0 to the Participating Parties for review and comment.
- The Proponent will be responsible for ensuring that all work that requires consultation with Tribal Nations is performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

#### *4.2.3 The Gay Head Lighthouse Advisory Committee*

- Identify expected list of maintenance tasks.
- Provide feedback on documentation described in Section 3.1 within 45 days.
- If required under the terms of the Preservation Restriction, the Committee shall submit the scope of work for maintenance activities to MHC for review and approval.
- The Committee shall ensure that all maintenance activities are conducted in accordance with the Secretary of the Interior (SOI) Standards for Rehabilitation (36 CFR 68), as part of their consultation with MHC.
- Provide annual report to Avangrid for submission to BOEM on annual maintenance activities.

#### *4.2.4 Massachusetts Historical Commission (MHC); Massachusetts State Historic Preservation Officer*

If necessary, the scope of work will be submitted under the terms of the Preservation Restriction and the scope of work will be submitted for compliance with the SOI Standards for Rehabilitation (36 CFR 68).

#### *4.2.5 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.

#### *4.2.6 Other Parties*

The Proponent does not anticipate additional consulting parties, should any be determined, this will be updated.

## 4.3 Participating Party Consultation

The Proponent has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide input on the resolution of adverse effects to, and forms of implementing mitigation, at the historic property of Gay Head Lighthouse. As part of the development of this draft HPTP, the Proponent will continue to conduct targeted outreach with the Participating Parties identified in Section 1.3. Notification will be sent to BOEM and applicable Participating Parties that the Treatment Plan has been implemented and is complete upon final development of the conditions of COP approval, the forthcoming MOA, and this HPTP.

## 5.0 REFERENCES


[BOEM] Bureau of Ocean Energy Management. 2020. Finding of adverse effect for the Vineyard Wind 1 Project Construction and Operations Plan. Revised November 13, 2020. Retrieved from: https://www.boem.gov/sites/default/files/documents/oil-gas-energy/Vineyard-Wind-Findingof-Adverse-Effect.pdf

DiStefano V, Salzam N. 1980. Cape Poge Light National Register Nomination. Fields J. 2006. Captain William Martin House Form B – Building. Massachusetts Cultural Resources Information System (MACRIS Maps 3.0 Beta) Online mapping program (August 10, 2020). https://maps.mhc-macris.net/.

Massachusetts Inventory of Historic and Archaeological Assets of the Commonwealth via Massachusetts Cultural Resources Information System (MACRIS) (August 10, 2020). Retrieved from: http://mhc-macris.net/.

National Park Service. 2020. National Register of Historic Places. Retrieved from: https://www.nps.gov/subjects/nationalregister/index.htm

NETROnline. 2020. Historic Aerials. Retrieved from: https://www.historicaerials.com/. Wood S, Purdum J, Egan B. 2014. Visualization simulations for offshore Massachusetts and Rhode Island Wind Energy Area - Meteorological report. OCS Study BOEM 2017-037. Retrieved from: https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/MA/MeteorologicalReportFinal.pdf

ATTACHMENT 8 – HISTORIC PROPERTY TREATMENT PLAN FOR [REDACTED] TCP

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# Draft New England Wind Historic Property Treatment Plan for [redacted] Traditional Cultural Property

*Submitted to:*
BUREAU OF OCEAN ENERGY MANAGEMENT
45600 Woodland Rd
Sterling, VA 20166

*Submitted by:*
Park City Wind LLC

*Prepared by:*
Epsilon Associates Inc.

December 2022

# TABLE OF CONTENTS



## List of Figures

## EXECUTIVE SUMMARY

This draft Historic Property Treatment Plan (HPTP) for the [redacted] Traditional Cultural Property (TCP) adversely affected by New England Wind provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation identified during the Section 106 consultation process in the forthcoming Memorandum of Agreement (MOA) with the Bureau of Ocean Energy Management (BOEM), the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation regarding the New England Wind project. The conditions of Construction and Operations Plan (COP) approval and the forthcoming MOA will identify a substantive baseline of specific mitigation measures to resolve the adverse visual effects to the properties identified below as a result of the construction and operation of New England Wind (the Undertaking) to satisfy requirements of Section 106 and 110(f) of the National Historic Preservation Act (NHPA) of 1966 (54 USC 300101; United States Code, 2016). This HPTP outlines the implementation steps and timeline for actions, and will be consistent with, or equivalent to, those substantive baseline mitigation measures identified in the conditions of COP approval and forthcoming MOA.

The National Environmental Policy Act (NEPA) substitution process will be utilized by BOEM to fulfill the Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). Furthermore, BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use the NEPA substitution process. This draft HPTP has been provided by the Proponent for inclusion in the Draft Environmental Impact Statement (DEIS) for review by BOEM and consulting parties. Meaningful input on the resolution of adverse effects to, and form(s) of implementation at, the historic properties is anticipated.

This draft HPTP includes the mitigation measures proposed by the Proponent for historic properties based on the evaluations and outreach performed by the Proponent prior to the issuance of the DEIS. It is anticipated that the draft HPTP will sustain further revision and refinement as consultation with the Massachusetts State Historic Preservation Officer, the ACHP, and/or other consulting parties through the NEPA substitution process. Should BOEM make a finding of adverse effect for the historic property, the mitigation measure(s) described herein (and in revisions) will be included in the Record of Decision (ROD) and/or 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 draft HPTP. This draft HPTP will be reviewed by, and further developed in, consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule.

This draft HPTP is organized into the following sections:

**Executive Summary**

**Section 1.0 Background Information**

This section outlines the content of this HPTP and provides a description of the proposed development of New England Wind.

**Section 2.0 Summary of Historic Property**

This section summarizes the historic property discussed in this HPTP that may be adversely affected by the Undertaking and summarizes the provisions, attachments, and findings that informed the development of this document, most notably the New England Wind Construction and Operations Plan (NE Wind COP) and the Historic Properties Visual Impact Assessment (Appendix III-H.b).

**Section 3.0 Mitigation Measures**

This section provides a review of mitigation measures proposed by the Proponent as identified in the COP or through consultation with stakeholders. Mitigation measure details may be revised during the consultation process.

**Section 4.0 Implementation**

This section establishes the process for executing the mitigation measures identified in Section 4.0. As the consultation process continues, details for each mitigation measure such as the organizational responsibilities, timeline, and regulatory review requirements will continue to be outlined.

**Section 5.0 References**

This section is a list of works cited for this draft HPTP.

# 1.0 BACKGROUND INFORMATION

## 1.1 Project Overview

New England Wind is the proposal to develop offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and onshore operations and maintenance (O&M) facilities. New England Wind will be developed in two Phases with a maximum of 130 wind turbine generator (WTG) and/or electrical service platform (ESP) positions. Four or five offshore export cables will transmit electricity generated by the WTGs to onshore transmission systems in the Town of Barnstable, Massachusetts. Figure 1.1-1 provides an overview of the New England Wind project. Park City Wind LLC, a wholly owned subsidiary of Avangrid Renewables, LLC, is the Proponent of this Construction and Operations Plan (COP) and will be responsible for the construction, operation, and decommissioning of New England Wind. The construction, operation, and decommissioning of the New England Wind project are defined as the Undertaking and are subject to Section 106 of the National Historic Preservation Act (NHPA).

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The Historic Properties Visual Impact Assessment (Appendix III-H.b of COP Volume III) for New England Wind is intended to assist BOEM and the Massachusetts Historical Commission (MHC), in its role as the State Historic Preservation Officer (SHPO), in their review of New England Wind under Section 106 of the NHPA and the National Environmental Policy Act. The Preliminary Area of Potential Effects (PAPE) described herein has been developed to assist BOEM and MHC in identifying historic resources listed, or eligible for listing, in the National Register of Historic Places (National Register) in order to assess the potential effects of New England Wind on historic properties.

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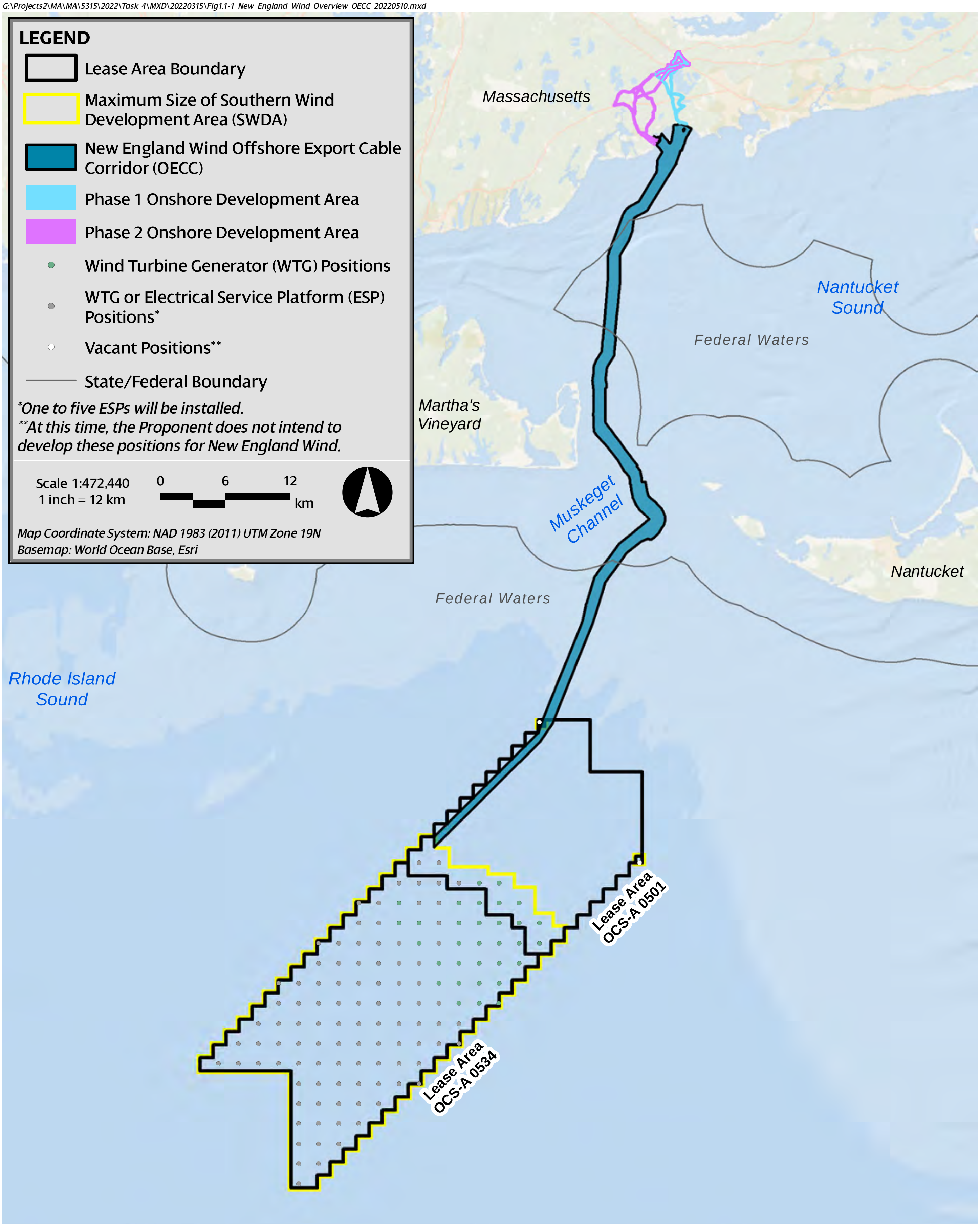


New England Wind

**Figure 1.1-1**

*New England Wind Overview*

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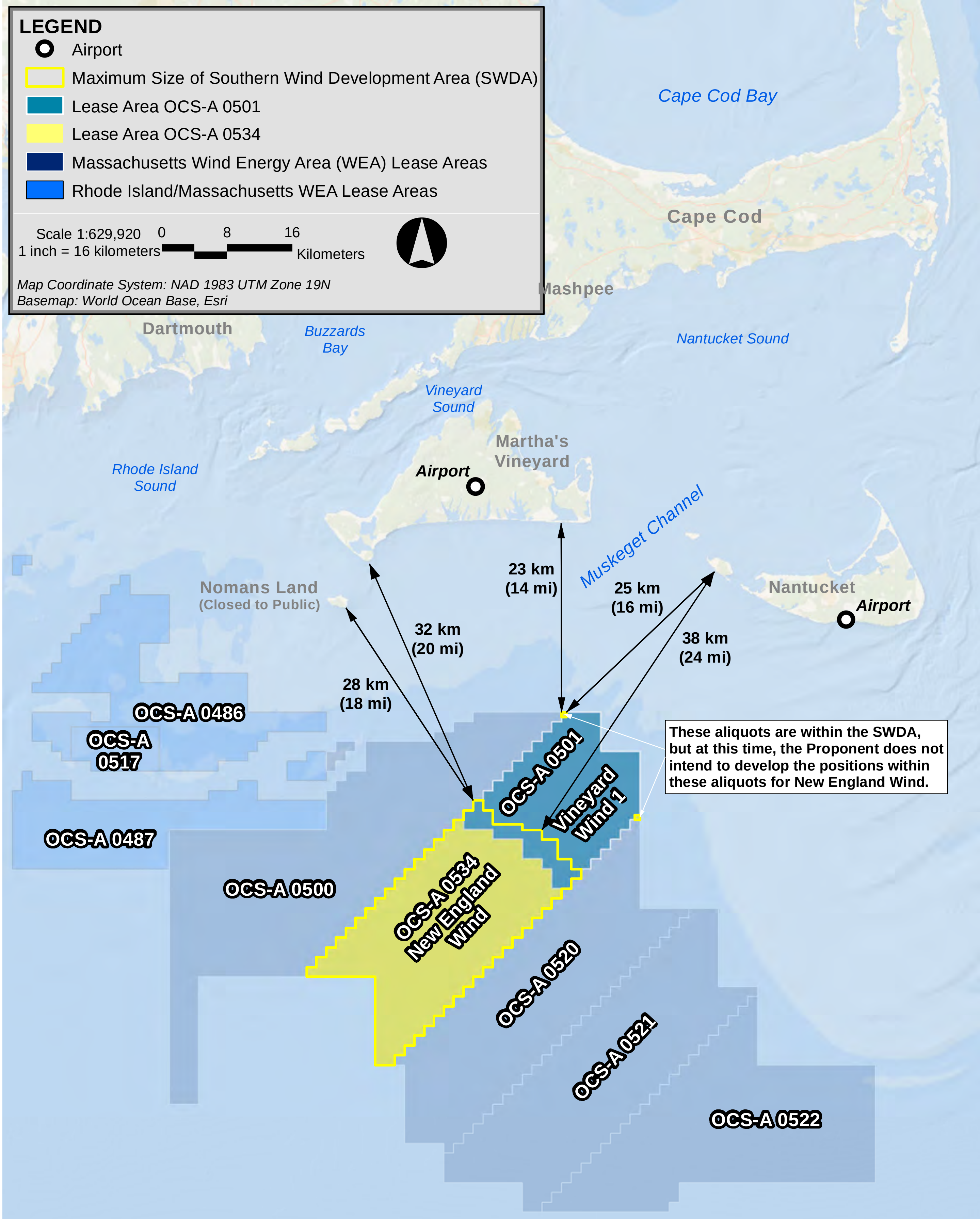


New England Wind
AVANGRID RENEWABLES

**Figure 1.1-2**
*SWDA - Nearest Onshore Areas*

## 1.2 Historic Property Treatment Plan (HPTP) and Section 106 of the National Historic Preservation Act (NHPA)

This Historic Property Treatment Plan (HPTP) will be developed in accordance with the Section 106 and Section 110(f) review (36 CFR 800) of the Undertaking and the forthcoming Memorandum of Agreement (MOA). This HPTP provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation identified during the Section 106 consultation process in the forthcoming Memorandum of Agreement (MOA) with the Bureau of Ocean Energy Management (BOEM), the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation regarding the New England Wind project.

The conditions of COP approval and forthcoming MOA will include measures to avoid and/or minimize adverse effects to identified historic properties, including planned distance of the Undertaking from historic properties, uniform WTG design, speed, height, and rotor diameter to reduce visual contrast, uniform spacing of WTGs to decrease visual clutter, and lighting and marking requirements to minimize visibility. This HPTP addresses the remaining mitigation provisions for the properties identified below.

All activities implemented under this HPTP will be conducted in accordance with the forthcoming conditionals of COP approval and the forthcoming MOA as well as with applicable local, state, and federal regulations and permitting requirements.

## 1.3 Participating Parties

The National Environmental Policy Act (NEPA) substitution process will be utilized by BOEM to fulfill the Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). BOEM hosted the first Section 106-specific meeting with consulting parties on March 3, 2022 and the Proponent 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.

The Proponent is also conducting outreach meetings with various stakeholders to review the findings of the analysis to date and initiate discussion of proposed mitigation measures. These are parties that demonstrated interest in the affected historic property (Participating Parties). The Proponent has conducted and/or anticipates conducting outreach with the following parties:

- The Town of Aquinnah
- The Massachusetts Historical Commission (MHC)
- The Massachusetts Board of Underwater Archaeological Resources (MBUAR)
- The Wampanoag Tribe of Gay Head (Aquinnah)
- The Mashpee Wampanoag Tribe
- [Other Tribes or consulting parties may be added]

The Proponent further anticipates the above-mentioned parties will participate in the finalization of this draft HPTP through BOEM's Section 106 consultation process. This list may be amended if any additional parties are identified during this process.

## 2.0 SUMMARY OF HISTORIC PROPERTY ([redacted] TRADTIONAL CULTURAL PROPERTY)

The [redacted] Traditional Cultural Property (TCP) [redacted]

The TCP is more fully described in a Historic Resources Visual Impact Assessment (VIA) prepared by another lessee, which describes [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

New England Wind
AVANGRID RENEWABLES

**Figure 2.0-1**

*Historic Property:* [redacted] *TCP*

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The [redacted] TCP is considered eligible for listing on the National Register under:

- [redacted]
- [redacted]
- [redacted]
- [redacted]

The maritime setting of this resource and its viewshed would be altered through the introduction of new elements. [redacted]

There are a variety of mitigating factors affecting potential visibility of the SWDA and the adverse effect. [redacted]

[redacted] will be minimized due to distance, environmental factors, the proposed paint color, and the proposed ADLS. Further, [redacted]

[redacted]

## 3.0 MITIGATION MEASURES

Mitigation measures for [redacted] TCP are detailed below. The Proponent will contribute funds not to exceed [redacted] to conduct one or more of the mitigation measures described under Sections 3.1 through 3.3.

### 3.1 Public Education for [redacted] TCP

**Purpose and Intended Outcome**

The Proponent is presently consulting with the Wampanoag Tribe of Gay Head (Aquinnah) and the Mashpee Wampanoag Tribe on New England Wind's potential effects to historic properties and mitigation ideas. The Proponent has agreed to contribute funds for public education purposes on [redacted] The Proponent will continue to consult with the Participating Parties to determine the most appropriate use of the funds and the scope of work.

**Scope of Work**

The scope of work will be developed in accordance with the Participating Parties and is envisioned to include the creation of public education materials. A consultant hired to create the materials will facilitate a meeting with Participating Parties to identify resources for interpretative exhibits and a medium of preference – printed or digital. If printed materials are preferred, the consultant will discuss with Participating Parties where such materials will be kept, [redacted]. Using interviews [redacted] and appropriate historical, archaeological and archival research, finished products will include information on the history, development, and significance of cultural resources [redacted] TCP. [redacted] Proposed finished products may include an informational pamphlet, website, audio tour and/or a combination of static and interactive interpretive materials.

**Methodology**

The Proponent will prepare an RFP and will consult with Participating Parties in defining objectives and scope of work, as well as in the consultant selection process.

**Standards**

All work will be conducted in accordance with state and federal applicable standards and will be overseen by professionals meeting the qualifications specified in the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61). All work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes. Professionals selected shall have demonstrated experience creating public education materials and documenting Traditional Cultural Properties per National Register Bulletin #30.

**Documentation**

The Proponent will provide the following documentation to the Participating Parties for their review:

- Draft proposed scope of work.
- RFP and consultant bids in response to RFP.
- Draft version of the educational materials for review and comment by the Participating Parties.
- Final version of the educational materials.
- Annual progress report to BOEM describing the implementation of the mitigation measures.

**Funds and Accounting**

Funding amounts for this specific mitigation measure 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.

## 3.2 Scholarships and Training for Tribal Resource and/or Environmental Stewardship

**Purpose and Intended Outcome**

The Proponent proposes funding for scholarships and fees in fields of relation to the historic resource. Examples of fields that could be applicable for professional training or certification include, but are not limited to anthropology, archaeology, astronomy aquaculture, biology, ethnohistory, history, marine construction/fisheries/sciences, or Native American studies.

**Scope of Work**

The scope of work will be developed in accordance with the Participating Parties and is envisioned to include scholarship and training for Tribal resource stewardship purposes.

**Methodology**

The Proponent will prepare an RFP and will consult with Participating Parties in defining objectives and scope of work, as well as in the consultant selection process.

**Standards**

All work will be conducted in accordance with state and federal applicable standards. All work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes. Professionals selected shall have demonstrated experience in education and training program management and fiscal reporting.

**Documentation**

The Proponent will provide the following documentation to the Participating Parties for their review:

- Draft proposed scope of work.
- RFP and consultant bids in response to RFP.
- Once complete, a summary report of the work completed will be distributed.
- Annual progress report to BOEM describing the implementation of the mitigation measures.

**Funds and Accounting**

Funding amounts for this specific mitigation measure 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. The total funding amount for mitigation measures described in Sections 3.1 through 3.3 will not exceed [redacted]

## 3.3 Coastal Resilience and Habitat Restoration

**Purpose and Intended Outcome**

Impacts to the TCP associated with climate change such as rising seas and water temperatures, expansion of invasive species, increased frequency and intensity of coastal storms etc., are expected to represent significant threats to the defining features of this historic property. The purpose and intended outcome of this mitigation measure is to provide funding for future planning and development of efforts to help mitigate the negative externalities associated with climate change.

**Scope of Work**

The scope of work will be developed in accordance with the Participating Parties and is envisioned to include coastal resilience and habitat restoration purposes.

**Methodology**

The Proponent will prepare an RFP and will consult with Participating Parties in defining objectives and scope of work, as well as in the consultant selection process.

**Standards**

All work will be conducted in accordance with state and federal applicable standards. All work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

**Documentation**

The Proponent will provide the following documentation to the Participating Parties for their review:

- Draft proposed scope of work.
- RFPs and consultant bids in response to RFP.
- Once complete, a summary report of the work completed will be distributed.
- Annual progress report to BOEM describing the implementation of the mitigation measures.

**Funds and Accounting**

Funding amounts for this specific mitigation measure 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. The total funding amount for mitigation measures described in Sections 3.1 through 3.3 will not exceed [redacted]

## 3.4 Additional Mitigation Measures

The Proponent is also implementing the following mitigation measures.

### *3.4.1 Uniform Layout and Paint Color Selection*

The Proponent is avoiding and minimizing visual impacts to the maximum extent practicable. The WTGs for each phase will have uniform design, height, and rotor diameter and will be aligned and spaced consistently with other offshore wind facilities, thereby reducing potential for visual clutter. Additionally, the WTGs will be no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey in color in accordance with BOEM and Federal Aviation Administration (FAA) guidance; the Proponent anticipates painting the WTGs off-white/light grey to reduce contrast with the sea and sky and thus, minimize daytime visibility of the WTGs. The conservative threshold for visibility in meteorological analyses is "the greatest distance at which an observer can just see a black object viewed against the horizon sky" (see Section 3.3 of Appendix III-H.a). The Phase 1 and Phase 2 WTGs will not be black; instead, the expected off-white/light grey color will be highly compatible with the hue, saturation, and brightness of the background sky. This lack of contrast between the WTGs and the background means that the percentage of the time the structures might be visible is greatly reduced. Additionally, the upper portion of the ESP(s) will be a grey color which would appear muted and indistinct. Color contrast decreases as distance increases. Color contrast will diminish or disappear completely during periods of haze, fog, or precipitation.

### *3.4.2 Lighting*

Lighting will be kept to the minimum necessary to comply with navigation safety requirements and safe operating conditions. Required marine navigation lights mounted near the top of each WTG/ESP foundation (or on the corners of each ESP) are expected to be visible only to distances of approximately 9.3 km (5 NM). As the closest coastal vantage point is at least 34.1 km (21.2 mi) from the nearest WTG, marine navigation lights will not be visible from shore.

### *3.4.3 Aircraft Detection Lighting Systems (ADLS)*

Subject to BOEM approval, the Proponent also expects to use an ADLS that automatically turns on, and off, aviation obstruction lights in response to the detection of aircraft for the Phase 1 WTGs. For Phase 2, the Proponent would expect to use the same or similar approaches used for Vineyard Wind 1 and/or Phase 1 to reduce lighting, including the use of an ADLS. Based on historical use of the airspace, it is estimated that the aviation obstruction lights on both the nacelle and tower (if needed) will be activated for less than one hour per year (less than 0.1% of the nighttime hours) (see Appendix III-K). The effect of nighttime lighting from the aviation obstruction lights is acknowledged as part of the overall visibility and visual effect of the SWDA; however, the effect of nighttime lighting is substantially minimized through the use of ADLS. As stated previously, meteorological conditions will serve to obscure or block view of the SWDA providing additional minimization of the effect of nighttime lighting. For Phase 1, the onshore export cables to the onshore substation will be primarily installed underground and will typically be within public roadway layouts, although portions of the duct bank may be within existing utility rights-of-way (ROWs). From the onshore substation, grid interconnection cables will also be installed underground. Underground installation of onshore cables is also expected for Phase 2, thus minimizing potential visual effects to adjacent properties.

# 4.0 IMPLEMENTATION

Construction activities of the Undertaking that adversely affect a specific historic property cannot begin until BOEM has accepted the HPTP for that specific adversely affected historic property, consistent with the forthcoming conditions of COP approval. Construction activities that do not adversely affect historic properties may proceed prior to acceptance of the HPTPs.

## 4.1 Timeline

The timeline and organizational responsibilities will be developed in consultation with BOEM and the Participating Parties as the conditions of COP approval and the MOA are developed concurrent with BOEM's National Environmental Policy Act (NEPA) substitution schedule for New England Wind which is currently anticipated to include the following key dates:

- December 2022 – Release of the Draft Environmental Impact Statement (DEIS) followed by a 60-day comment period for the DEIS.
- September 2023 -- Release of Final Environmental Impact Statement (FEIS).
- October 2023 -- NEPA Record of Decision (ROD) issuance.

It is anticipated that the mitigation measures identified in Section 3.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the Participating Parties and accepted by BOEM. Per Section 3.0, the Participating Parties will have a minimum of 45 days to review and comment on all draft reports or other work products developed for this HPTP. The Proponent 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 Participating Parties and accepted by BOEM.

## 4.2 Organizational Responsibilities

### *4.2.1 Bureau of Ocean Energy Management (BOEM)*

- BOEM is responsible for making all federal decisions and determining compliance with Section 106.
- BOEM must review and accept the HPTP before the implementing party may commence any actions.
- BOEM is responsible for consultation related to dispute resolution.
- BOEM in consultation with the Participating Parties will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA.
- BOEM will be responsible for sharing the annual summary report with Participating Parties.

### *4.2.2 Avangrid Renewables, LLC*

- The Proponent will be responsible for implementing the HPTP.

- The Proponent will be responsible for considering the comments provided by the parties identified.
- Annual reporting to BOEM on implementation of the HPTP.
- Funding the mitigation measures specified in Section 3.0.
- Completion of the scope(s) of work in Section 3.0.
- Ensuring all Standards in Section 3.0 are met.
- Providing the Documentation in Section 3.0 to the Participating Parties for review and comment.
- The Proponent 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.

#### *4.2.3 Participating Parties*

- Identify resources of significance to support public education mitigation measure (if selected).
- Provide feedback on draft scope of work, RFP, and consultant bids within 45 days.
- Provide feedback on draft materials within 45 days.

#### *4.2.4 Other Parties*

The Proponent does not anticipate additional consulting parties; however, should any be determined, this will be updated.

### 4.3 Participating Party Consultation

The Proponent has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide input on the resolution of adverse effects to, and forms of implementing mitigation, to [redacted] TCP. As part of the development of this draft HPTP, the Proponent will continue to conduct targeted outreach with the Participating Parties identified in Section 1.3. Notification will be sent to BOEM and applicable Participating Parties that the Treatment Plan has been implemented and is complete upon final development of the conditions of COP approval, the forthcoming MOA, and this HPTP.

## 5.0 REFERENCES


[BOEM] Bureau of Ocean Energy Management. 2020. Finding of adverse effect for the Vineyard Wind 1 Project Construction and Operations Plan. Revised November 13, 2020. Retrieved from: https://www.boem.gov/sites/default/files/documents/oil-gas-energy/Vineyard-Wind-Findingof-Adverse-Effect.pdf

[redacted]

Massachusetts Inventory of Historic and Archaeological Assets of the Commonwealth via Massachusetts Cultural Resources Information System (MACRIS) (August 10, 2020). Retrieved from: http://mhc-macris.net/.

National Park Service. 2020. National Register of Historic Places. Retrieved from: https://www.nps.gov/subjects/nationalregister/index.htm

NETROnline. 2020. Historic Aerials. Retrieved from: https://www.historicaerials.com/.

Wood S, Purdum J, Egan B. 2014. Visualization simulations for offshore Massachusetts and Rhode Island Wind Energy Area - Meteorological report. OCS Study BOEM 2017-037. Retrieved from: https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/MA/MeteorologicalReportFinal.pdf

ATTACHMENT 9 – HISTORIC PROPERTY TREATMENT PLAN FOR [REDACTED] TCP

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# Draft New England Wind Historic Property Treatment Plan for the [redacted] Traditional Cultural Property

*Submitted to:*
BUREAU OF OCEAN ENERGY MANAGEMENT
45600 Woodland Rd
Sterling, VA 20166

*Submitted by:*
Park City Wind LLC

*Prepared by:*
Epsilon Associates Inc.

December 2022

# TABLE OF CONTENTS



## List of Figures

## EXECUTIVE SUMMARY

This draft Historic Property Treatment Plan (HPTP) for the [redacted] Traditional Cultural Property (TCP) adversely affected by New England Wind provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation identified during the Section 106 consultation process in the forthcoming Memorandum of Agreement (MOA) with the Bureau of Ocean Energy Management (BOEM), the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation regarding the New England Wind project. The conditions of Construction and Operations Plan (COP) approval and the forthcoming MOA will identify a substantive baseline of specific mitigation measures to resolve the adverse visual effects to the properties identified below as a result of the construction and operation of New England Wind (the Undertaking) to satisfy requirements of Section 106 and 110(f) of the National Historic Preservation Act (NHPA) of 1966 (54 USC 300101; United States Code, 2016). This HPTP outlines the implementation steps and timeline for actions, and will be consistent with, or equivalent to, those substantive baseline mitigation measures identified in the conditions of COP approval and forthcoming MOA.

The National Environmental Policy Act (NEPA) substitution process will be utilized by BOEM to fulfill the Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). Furthermore, BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use the NEPA substitution process. This draft HPTP has been provided by the Proponent for inclusion in the Draft Environmental Impact Statement (DEIS) for review by BOEM and consulting parties. Meaningful input on the resolution of adverse effects to, and form(s) of implementation at, the historic properties is anticipated.

This draft HPTP includes the mitigation measures proposed by the Proponent for historic properties based on the evaluations and outreach performed by the Proponent prior to the issuance of the DEIS. It is anticipated that the draft HPTP will sustain further revision and refinement as consultation with the Massachusetts State Historic Preservation Officer, the ACHP, and/or other consulting parties through the NEPA substitution process. Should BOEM make a finding of adverse effect for the historic property, the mitigation measure(s) described herein (and in revisions) will be included in the Record of Decision (ROD) and/or 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 draft HPTP. This draft HPTP will be reviewed by, and further developed in, consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule.

This draft HPTP is organized into the following sections:

**Executive Summary**

**Section 1.0 Background Information**

This section outlines the content of this HPTP and provides a description of the proposed development of New England Wind.

**Section 2.0 Summary of Historic Property**

This section summarizes the historic property discussed in this HPTP that may be adversely affected by the Undertaking and summarizes the provisions, attachments, and findings that informed the development of this document, most notably the New England Wind Construction and Operations Plan (NE Wind COP) and the Historic Properties Visual Impact Assessment (Appendix III-H.b).

**Section 3.0 Mitigation Measures**

This section provides a review of mitigation measures proposed by the Proponent as identified in the COP or through consultation with stakeholders. Mitigation measure details may be revised during the consultation process.

**Section 4.0 Implementation**

This section establishes the process for executing the mitigation measures identified in Section 4.0. As the consultation process continues, details for each mitigation measure such as the organizational responsibilities, timeline, and regulatory review requirements will continue to be outlined.

**Section 5.0 References**

This section is a list of works cited for this draft HPTP.

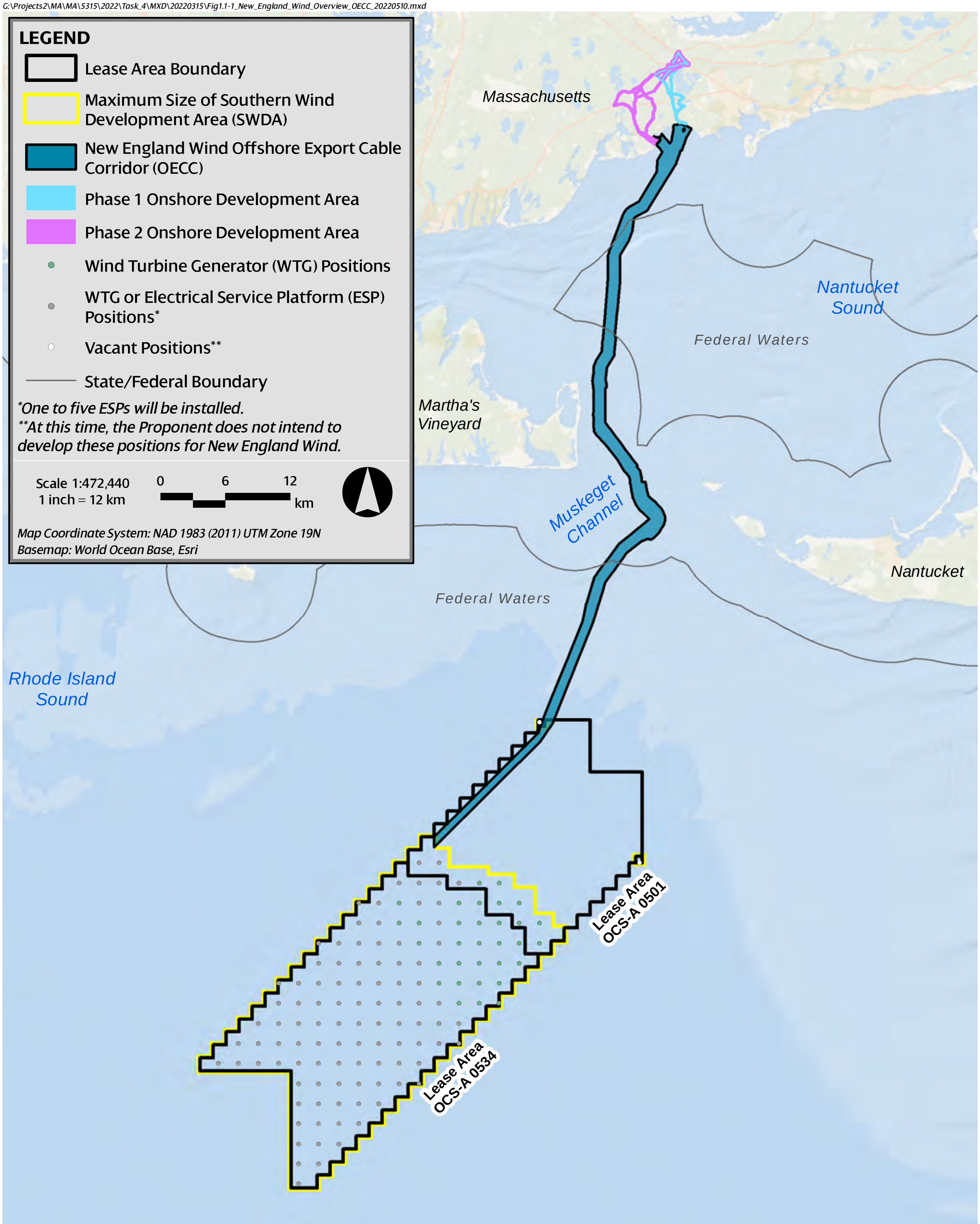
# 1.0 BACKGROUND INFORMATION

## 1.1 Project Overview

New England Wind is the proposal to develop offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and onshore operations and maintenance (O&M) facilities. New England Wind will be developed in two Phases with a maximum of 130 wind turbine generator (WTG) and/or electrical service platform (ESP) positions. Four or five offshore export cables will transmit electricity generated by the WTGs to onshore transmission systems in the Town of Barnstable, Massachusetts. Figure 1.1-1 provides an overview of the New England Wind project. Park City Wind LLC, a wholly owned subsidiary of Avangrid Renewables, LLC, is the Proponent of this Construction and Operations Plan (COP) and will be responsible for the construction, operation, and decommissioning of New England Wind. The construction, operation, and decommissioning of the New England Wind project are defined as the Undertaking and are subject to Section 106 of the National Historic Preservation Act (NHPA).

New England Wind's offshore renewable wind energy facilities are located immediately southwest of Vineyard Wind 1, which is located in Lease Area OCS-A 0501. New England Wind will occupy all of Lease Area OCS-A 0534 and potentially a portion of Lease Area OCS-A 0501 in the event that Vineyard Wind 1 does not develop "spare" or extra positions included in Lease Area OCS-A 0501 and Vineyard Wind 1 assigns those positions to Lease Area OCS-A 0534. For the purposes of the COP, the Southern Wind Development Area (SWDA) is defined as all of Lease Area OCS-A 0534 and the southwest portion of Lease Area OCS-A 0501, as shown in Figure 1.1-1. The SWDA may be approximately 411–453 square kilometers (km2) (101,590– 111,939 acres) in size depending upon the final footprint of Vineyard Wind 1. At this time, the Proponent does not intend to develop the two positions in the separate aliquots located along the northeastern boundary of Lease Area OCS-A 0501 as part of New England Wind. The SWDA (excluding the two separate aliquots closer to shore) is just over 32 kilometers (km) (20 miles [mi]) from the southwest corner of Martha's Vineyard and approximately 38 km (24 mi) from Nantucket (see Figure 1.1-2). Within the SWDA, the closest WTG is approximately 34.1 km (21.2 mi) from Martha's Vineyard and 40.4 km (25.1 mi) from Nantucket. The WTGs and ESP(s) in the SWDA will be oriented in an east-west, north-south grid pattern with one nautical mile (NM) (1.85 km) spacing between positions.

The Historic Properties Visual Impact Assessment (Appendix III-H.b of COP Volume III) for New England Wind is intended to assist BOEM and the Massachusetts Historical Commission (MHC), in its role as the State Historic Preservation Officer (SHPO), in their review of New England Wind under Section 106 of the NHPA and the National Environmental Policy Act. The Preliminary Area of Potential Effects (PAPE) described herein has been developed to assist BOEM and MHC in identifying historic resources listed, or eligible for listing, in the National Register of Historic Places (National Register) in order to assess the potential effects of New England Wind on historic properties.

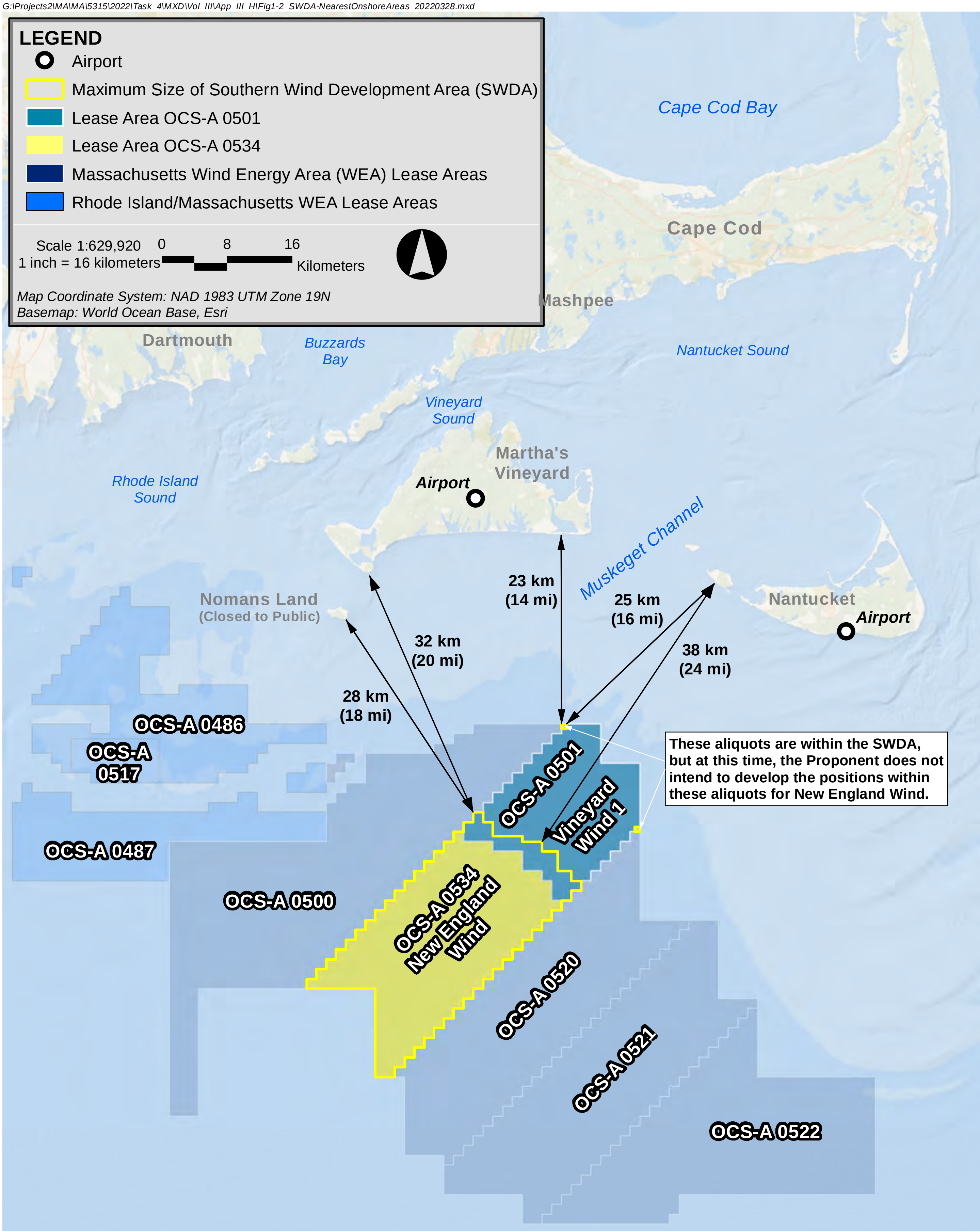



New England Wind

AVANGRID RENEWABLES

**Figure 1.1-1**

*New England Wind Overview*




New England Wind

AVANGRID RENEWABLES

**Figure 1.1-2**

*SWDA - Nearest Onshore Areas*

## 1.2 Historic Property Treatment Plan (HPTP) and Section 106 of the National Historic Preservation Act (NHPA)

This Historic Property Treatment Plan (HPTP) will be developed in accordance with the Section 106 and Section 110(f) review (36 CFR 800) of the Undertaking and the forthcoming Memorandum of Agreement (MOA). This HPTP provides background data, historic property information, and detailed steps that will be implemented to carry out the mitigation identified during the Section 106 consultation process in the forthcoming Memorandum of Agreement (MOA) with the Bureau of Ocean Energy Management (BOEM), the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation regarding the New England Wind project.

The conditions of COP approval and forthcoming MOA will include measures to avoid and/or minimize adverse effects to identified historic properties, including planned distance of the Undertaking from historic properties, uniform WTG design, speed, height, and rotor diameter to reduce visual contrast, uniform spacing of WTGs to decrease visual clutter, and lighting and marking requirements to minimize visibility. This HPTP addresses the remaining mitigation provisions for the properties identified below.

All activities implemented under this HPTP will be conducted in accordance with the forthcoming conditionals of COP approval and the forthcoming MOA as well as with applicable local, state, and federal regulations and permitting requirements.

## 1.3 Participating Parties

The National Environmental Policy Act (NEPA) substitution process will be utilized by BOEM to fulfill the Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). BOEM hosted the first Section 106-specific meeting with consulting parties on March 3, 2022 and the Proponent 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.

The Proponent is also conducting outreach meetings with various stakeholders to review the findings of the analysis to date and initiate discussion of proposed mitigation measures. These are parties that demonstrated interest in the affected historic property (Participating Parties). The Proponent has conducted and/or anticipates conducting outreach with the following parties:

- The Massachusetts Historical Commission (MHC)
- The Massachusetts Board of Underwater Resources (MBUAR)
- The Wampanoag Tribe of Gay Head (Aquinnah)
- The Mashpee Wampanoag Tribe
- The Chappaquiddick Tribe of Wampanoag Nation
- *[Other Tribes or consulting parties]*

The Proponent further anticipates the above-mentioned parties will participate in the finalization of this draft HPTP through BOEM's Section 106 consultation process. This list may be amended if any additional parties are identified during this process.

## 2.0 SUMMARY OF HISTORIC PROPERTY ([redacted] TRADTIONAL CULTURAL PROPERTY)

[redacted] has been determined eligible for listing on the National Register as a traditional cultural property by the Keeper of the National Register. Roughly bound [redacted] (Figure 2.0-1). The Keeper in her review of eligibility criteria determined that:

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]

[redacted] Additionally, there will be no visual effect from New England Wind's undersea cables. For the southern view, visibility of the SWDA will be intermittent depending upon weather conditions and the WTGs would only be visible slightly above the horizon line.

Per BOEM guidance on April 12, 2022, views from [redacted]

[redacted]

[redacted] SALs are interpreted as remnants of past terrestrial and shallow marine environments that existed along previous coastlines during lower stands of sea level. The landforms now appear buried below the seafloor at varying depths due to different processes acting upon the continental shelf over the past 15,000 years. While no intact archaeological artifacts, deposits, resources, or sites have been identified offshore, the SALs represent locations of higher significance with the potential to contain those cultural resources.  Further details on the SALs are included in the Submerged Ancient Landform HPTP, as well as in the Marine Archaeological Resources Assessment included as Volume II-D of the COP.

[redacted]

New England Wind

AVANGRID RENEWABLES

**Figure 2.0-1**

*Historic Property:* [redacted] *TCP*

## 3.0 MITIGATION MEASURES

Mitigation measures for the [redacted] TCP are detailed below.

### 3.1 Mitigation Measures

Mitigation measures are proposed below, however; ongoing consultation has informed the importance of Submerged Ancient Landforms (SALs) and the SAL study proposed below and detailed in the SAL HPTP will serve as the main focus of mitigation for the [redacted] TCP.

#### *3.1.1 Submerged Ancient Landform (SAL) Study*

As noted in Section 2.0, potential SALs have been identified [redacted] TCP. In order to mitigate adverse effects to SALs, the Proponent is proposing to conduct additional archaeological investigations on unavoidable SALs in the OECC. Further details on the SALs and the proposed mitigation measures are included in the Submerged Ancient Landform HPTP, as well as in the Marine Archaeological Resources Assessment included as Volume II-D of the COP.

#### *3.1.2 Uniform Layout and Paint Color Selection*

The Proponent is avoiding and minimizing visual impacts to the maximum extent practicable. The WTGs for each phase will have uniform design, height, and rotor diameter and will be aligned and spaced consistently with other offshore wind facilities, thereby reducing potential for visual clutter. Additionally, the WTGs will be no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey in color in accordance with BOEM and Federal Aviation Administration (FAA) guidance; the Proponent anticipates painting the WTGs off-white/light grey to reduce contrast with the sea and sky and thus, minimize daytime visibility of the WTGs. The conservative threshold for visibility in meteorological analyses is “the greatest distance at which an observer can just see a black object viewed against the horizon sky” (see Section 3.3 of Appendix III-H.a). The Phase 1 and Phase 2 WTGs will not be black; instead, the expected off-white/light grey color will be highly compatible with the hue, saturation, and brightness of the background sky. This lack of contrast between the WTGs and the background means that the percentage of the time the structures might be visible is greatly reduced. Additionally, the upper portion of the ESP(s) will be a grey color which would appear muted and indistinct. Color contrast decreases as distance increases. Color contrast will diminish or disappear completely during periods of haze, fog, or precipitation.

#### *3.1.3 Lighting*

Lighting will be kept to the minimum necessary to comply with navigation safety requirements and safe operating conditions. Required marine navigation lights mounted near the top of each WTG/ESP foundation (or on the corners of each ESP) are expected to be visible only to distances of approximately 9.3 km (5 NM). As the closest coastal vantage point is at least 34.1 km (21.2 mi) from the nearest WTG, marine navigation lights will not be visible from shore.

### *3.1.4 Aircraft Detection Lighting Systems (ADLS)*

Subject to BOEM approval, the Proponent also expects to use an Aircraft Detection Lighting System (ADLS) that automatically turns on, and off, aviation obstruction lights in response to the detection of aircraft for the Phase 1 WTGs. For Phase 2, the Proponent would expect to use the same or similar approaches used for Vineyard Wind 1 and/or Phase 1 to reduce lighting, including the use of an ADLS. Based on historical use of the airspace, it is estimated that the aviation obstruction lights on both the nacelle and tower (if needed) will be activated for less than one hour per year (less than 0.1% of the nighttime hours) (see Appendix III-K). The effect of nighttime lighting from the aviation obstruction lights is acknowledged as part of the overall visibility and visual effect of the SWDA; however, the effect of nighttime lighting is substantially minimized through the use of ADLS. As stated previously, meteorological conditions will serve to obscure or block view of the SWDA providing additional minimization of the effect of nighttime lighting. For Phase 1, the onshore export cables to the onshore substation will be primarily installed underground and will typically be within public roadway layouts, although portions of the duct bank may be within existing utility rights-of-way (ROWs). From the onshore substation, grid interconnection cables will also be installed underground. Underground installation of onshore cables is also expected for Phase 2, thus minimizing potential visual effects to adjacent properties.

## 4.0 IMPLEMENTATION

Construction activities of the Undertaking that adversely affect a specific historic property cannot begin until BOEM has accepted the HPTP for that specific adversely affected historic property, consistent with the forthcoming conditions of COP approval. Construction activities that do not adversely affect historic properties may proceed prior to acceptance of the HPTPs.

### 4.1 Timeline

The timeline and organizational responsibilities will be developed in consultation with BOEM and the Participating Parties as the conditions of COP approval and the MOA are developed concurrent with BOEM's National Environmental Policy Act (NEPA) substitution schedule for New England Wind which is currently anticipated to include the following key dates:

- December 2022 – Release of the Draft Environmental Impact Statement (DEIS) followed by a 60-day comment period for the DEIS.
- September 2023 -- Release of Final Environmental Impact Statement (FEIS).
- October 2023 -- NEPA Record of Decision (ROD) issuance.

It is anticipated that the mitigation measures identified in Section 3.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the Participating Parties and accepted by BOEM. Per Section 3.0, the Participating Parties will have a minimum of 45 days to review and comment on all draft reports or other work products developed for this HPTP. The Proponent 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 Participating Parties and accepted by BOEM.

### 4.2 Organizational Responsibilities

#### *4.2.1 Bureau of Ocean Energy Management (BOEM)*

- BOEM is responsible for making all federal decisions and determining compliance with Section 106.
- BOEM must review and accept the HPTP before the implementing party may commence any actions.
- BOEM is responsible for consultation related to dispute resolution.
- BOEM in consultation with the Participating Parties will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA.
- BOEM will be responsible for sharing the annual summary report with Participating Parties.

#### *4.2.2 Avangrid Renewables, LLC*

- The Proponent will be responsible for implementing the HPTP.

- The Proponent will be responsible for considering the comments provided by the parties identified.
- Annual reporting to BOEM on the implementation of the HPTP.
- Funding the mitigation measures specified in Section 3.0.
- Completion of the scope(s) of work in Section 3.0.
- The Proponent 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.

#### *4.2.3 Participating Parties*

Participating Parties are responsible for providing feedback on draft materials associated with the SAL study within 45 days.

#### *4.2.3 Other Parties*

The Proponent does not anticipate additional consulting parties, should any be determined, this will be updated.

### 4.3 Participating Party Consultation

The Proponent has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide input on the resolution of adverse effects to, and forms of implementing mitigation, to [redacted] TCP. As part of the development of this draft HPTP, the Proponent will continue to conduct targeted outreach with the Participating Parties identified in Section 1.3. Notification will be sent to BOEM and applicable Participating Parties that the Treatment Plan has been implemented and is complete upon final development of the conditions of COP approval, the forthcoming MOA, and this HPTP.

## 5.0 REFERENCES

[BOEM] Bureau of Ocean Energy Management. 2020. Finding of adverse effect for the Vineyard Wind 1 Project Construction and Operations Plan. Revised November 13, 2020. Retrieved from: https://www.boem.gov/sites/default/files/documents/oil-gas-energy/Vineyard-Wind-Findingof-Adverse-Effect.pdf

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ATTACHMENT 10 – NEW ENGLAND WIND PHASED IDENTIFICATION PLAN

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# New England Wind Phased Identification Plan for Terrestrial Archaeology

*Submitted to:*
Bureau of Ocean Energy Management
45600 Woodland Rd
Sterling, VA 20166

*Submitted by:*
Park City Wind LLC

*Prepared by:*
Epsilon Associates Inc.

December 2022

# TABLE OF CONTENTS



## List of Figures



## List of Tables

# 1.0 INTRODUCTION

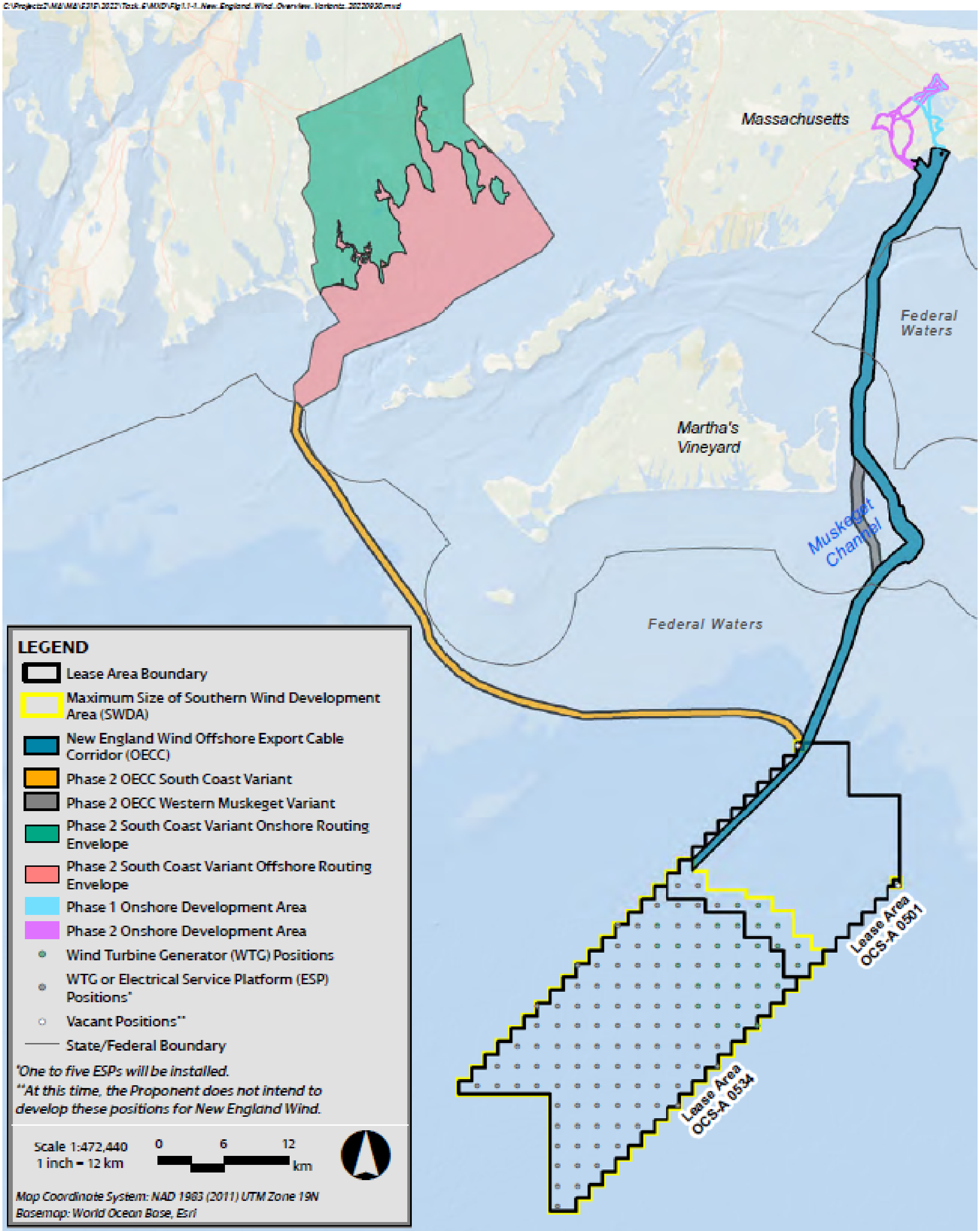
The following document is a supplement to the New England Wind Terrestrial Archaeology Resource Assessment (TARA) distributed for National Historic Preservation Act (NHPA) Section 106 Consultation. Preparation of the TARA is ongoing while property access permissions are acquired to conduct Phase 1B archaeological investigations for potential substation locations and associated cable routes. The Bureau of Ocean Energy Management (BOEM) has determined, in accordance with Section 106 regulations (36 CFR § 800.4 (b)(2)), that a phased identification approach is appropriate for the survey, reporting, and consultation related to this outstanding archaeological investigation. The Phased Identification Plan for Terrestrial Archaeology below serves as a process document detailing the steps New England Wind expects to take to complete the required cultural resources survey and includes a schedule of associated milestones. All milestones are anticipated to be completed before issuance of the Final Environmental Impact Statement (FEIS) and BOEM's Record of Decision (ROD).

## 1.1 Description of the Undertaking

### *1.1.1 Project Overview*

New England Wind is the proposal to develop offshore renewable wind energy facilities in BOEM Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and onshore operations and maintenance (O&M) facilities. New England Wind will be developed in two Phases with a maximum of 130 wind turbine generator (WTG) and/or electrical service platform (ESP) positions. Four or five offshore export cables will transmit electricity generated by the WTGs to onshore transmission systems in the Town of Barnstable, Massachusetts. Figure 1.1-1 provides an overview of the New England Wind project. Park City Wind LLC, a wholly owned subsidiary of Avangrid Renewables, LLC, is the Proponent of this Construction and Operations Plan (COP) and will be responsible for the construction, operation, and decommissioning of New England Wind.

New England Wind's proposed offshore renewable wind energy facilities are located in Lease Area OCS-A 0534. New England Wind will occupy all of Lease Area OCS-A 0534 and potentially a portion of Lease Area OCS-A 0501 in the event that Vineyard Wind 1 does not develop "spare" or extra positions included in Lease Area OCS-A 0501 and Vineyard Wind 1 assigns those positions to Lease Area OCS-A 0534. For the purposes of this application, the Southern Wind Development Area (SWDA) is defined as all of Lease Area OCS-A 0534 and the southwest portion of Lease Area OCS-A 0501. The SWDA may be approximately 411–453 square kilometers (km2) (101,590– 111,939 acres) in size depending upon the final footprint of Vineyard Wind 1. At this time, the Proponent does not intend to develop the two positions in the separate aliquots located along the northeastern boundary of Lease Area OCS-A 0501 as part of New England Wind. The SWDA (excluding the two separate aliquots closer to shore) is just over 32 kilometers (km) (20 miles [mi]) from the southwest corner of Martha's Vineyard and approximately 38 km (24 mi) from Nantucket. Within the SWDA, the closest WTG is approximately 34.1 km (21.2 mi) from Martha's




New England Wind

**Figure 1.1-1**

*New England Wind Overview*

Vineyard and 40.4 km (25.1 mi) from Nantucket. The WTGs and ESP(s) in the SWDA will be oriented in an east-west, north-south grid pattern with one nautical mile (NM) (1.85 km) spacing between positions. See Figure 1.1-1 for an overview of New England Wind.

**Phase 1 of New England Wind**

Phase 1, which includes Park City Wind, will be developed immediately southwest of the Vineyard Wind 1 project. The Phase 1 Envelope includes 41 to 62 WTGs and one or two ESP(s). Depending upon the capacity of the WTGs, Phase 1 will occupy 150–231 km2 (37,066–57,081 acres) of the SWDA. The Phase 1 Envelope includes two WTG foundation types: monopiles and piled jackets. Strings of WTGs will connect with the ESP(s) via a submarine inter-array cable transmission system. The ESP(s) will also be supported by a monopile or jacket foundation. Two high-voltage alternating current (HVAC) offshore export cables up to 101 km (54 NM) in length (per cable) installed within the SWDA and an Offshore Export Cable Corridor (OECC) will transmit electricity from the ESP(s) to a landfall site at the Craigville Public Beach or Covell's Beach in the Town of Barnstable. Underground onshore export cables, located principally in roadway layouts, will connect the landfall site to a new Phase 1 onshore substation in Barnstable. Grid interconnection cables will then connect the Phase 1 onshore substation to the ISO New England (ISO-NE) electric grid at Eversource's existing 345 kilovolt substation in West Barnstable.

**Phase 2 of New England Wind**

Phase 2, which includes Commonwealth Wind, will be immediately southwest of Phase 1 and will occupy the remainder of the SWDA. Phase 2 may include one or more projects, depending on market conditions. The footprint and total number of WTG and ESP positions in Phase 2 depends upon the final footprint of Phase 1; Phase 2 is expected to include 64 to 88 WTG/ESP positions (up to three positions will be occupied by ESPs) within an area ranging from 222–303 $km^2$ (54,857–74,873 acres). The Phase 2 Envelope includes three general WTG foundation types: monopiles, jackets (with piles or suction buckets), or bottom-frame foundations (with piles or suction buckets). Inter-array cables will transmit electricity from the WTGs to the ESP(s). The ESP(s) will also be supported by a monopile or jacket foundation (with piles or suction buckets).

Two or three HVAC offshore export cables, each with a maximum length of 116–124 km (63–67 NM) per cable, will transmit power from the ESP(s) to shore. Unless technical, logistical, grid interconnection, or other unforeseen issues arise, all Phase 2 offshore export cables will be installed within the same OECC as the Phase 1 cables from the northwestern corner of the SWDA to within approximately 2–3 km (1–2 mi) of shore, at which point the OECC for Phase 2 will diverge to the Dowses Beach Landfall Site and/or Wianno Avenue Landfall Site in Barnstable.[1] Underground onshore export cables, located primarily within in roadway layouts, will connect the

[1] As described further in Section 4.1.3 of COP Volume I, the Proponent has identified two variations of the Phase 2 OECC in the event that technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes that preclude one or more Phase 2 offshore export cables from being installed within all or a portion of the OECC.

landfall site(s) to one or two new onshore substations in the Town of Barnstable. Grid interconnection cables will then connect the onshore substation site(s) to the West Barnstable Substation.

#### *1.1.2 Required Permits*

Table 1 in Appendix A lists the required federal, state, regional (county), and local level reviews and permits. Filing dates are provided for those permit applications or review documents that have already been submitted.

#### *1.1.3 Agency and Public Outreach*

The Proponent has been actively consulting with BOEM, federal and state agencies, regional commissions, affected municipalities, and federally-recognized tribes since 2019. A list of meetings related to the New England Wind project, conducted as of March 2021 is provided in Volume I of the COP at Table 5.2-1. In addition to these meetings, members of the Proponent's team have participated in hundreds of meetings with agencies, tribes, and municipalities since 2015 regarding the development of Vineyard Wind 1.

Following the submittal of initial filings in 2020, there have been and will continue to be a number of agency-convened public hearings and informational meetings. These include BOEM/National Environmental Policy Act (NEPA) scoping sessions, Massachusetts EFSB public statement hearing(s), and a Massachusetts Environmental Policy Act (MEPA) consultation session(s).

In addition to the consultations described above, extensive and ongoing consultations with key stakeholders have been conducted by the Proponent and its community partner, Vineyard Power Cooperative (Vineyard Power). To-date, the Proponent has held dozens of information sessions and regularly holds office hours sessions in Barnstable, Covell's Beach, Martha's Vineyard, and across Cape Cod. The Proponent also sponsors and staffs information tables at a variety of environmental, fisheries-related, and community events to reach a variety of stakeholders.

The Proponent also has a dedicated team to lead outreach with state- and federally-recognized tribes and other relevant stakeholders. The Proponent anticipates conducting additional outreach to those parties with a demonstrated interest in this Phased Identification Plan for Terrestrial Archaeology.

### 1.2 Area of Potential Effect (APE)

The Area of Potential Effects (APE) is defined in 36 CFR § 800.16 as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." The APE for direct physical effects to onshore/terrestrial archaeological resources is defined as any areas of ground disturbance that may occur within the footprint of New England Wind's onshore facilities and construction staging areas.

### *1.2.1 Phase 1*

For Phase 1, the Preliminary APE (PAPE) for onshore direct physical effects includes potential Onshore Export Cable Routes, Grid Interconnection Routes, landfall sites, proposed substation site and associated parcels at 6 and 8 Shootflying Hill Road, and Parcel #214-001, and onshore construction staging areas (see Figure 1.2-1). Phase 1 potential onshore export cabling routes are sited along existing roadways or utility rights-of-ways (ROWs) and onshore cables will be installed underground. Wherever possible, expanded work zones and construction staging areas along the onshore routes will be located within previously developed areas, such as nearby parking lots. The proposed Phase 1 substation at 8 Shootflying Hill Road will connect to the existing West Barnstable Substation. An adjacent parcel at 6 Shootflying Hill Road, which is located immediately northeast of the proposed substation site, will be used for an improved access road to the onshore substation site. An additional parcel of land (Parcel #214-001) located immediately southeast of the existing West Barnstable Substation is expected to be utilized for Phase 1.

### *1.2.2 Phase 2*

For Phase 2, the PAPE for onshore direct physical effects includes potential Onshore Export Cable Routes and Grid Interconnection Routes, landfall sites, proposed onshore substation site(s), Parcel #214-001, and onshore construction staging areas (see Figure 1.2-1). Phase 2 potential onshore export cabling routes are sited along existing roadways or utility ROWs and onshore cables will be installed underground. Wherever possible, expanded work zones and construction staging areas along the onshore routes will be located within previously developed areas, such as nearby parking lots. Similar to Phase 1, Phase 2 includes an interconnection at the existing West Barnstable Substation and includes potential use of an adjacent parcel (Parcel #214-001) to accomplish a cable crossing under the Route 6 highway corridor.

## 1.3 Identification of Historic Properties

Terrestrial archaeology surveys have been conducted for each Phase of New England Wind. Detailed survey reports are included in Appendix III-G of the COP. A summary of work completed for each Phase to date is included below.

**Phase 1**

In May 2020, an archaeological reconnaissance survey was conducted for the Phase 1 Onshore Development Area (as shown on Figure 1.2-1). The reconnaissance survey included the (1) landfall sites, (2) Onshore Export Cable Routes, (3) onshore substation site, (4) Grid Interconnection Routes, which connect the onshore substation to the grid interconnection point, and (5) the grid interconnection point at the West Barnstable Substation. An archaeological sensitivity assessment was prepared for the Phase 1 Onshore Development Area and zones of low, moderate, and high archaeological sensitivity were identified.

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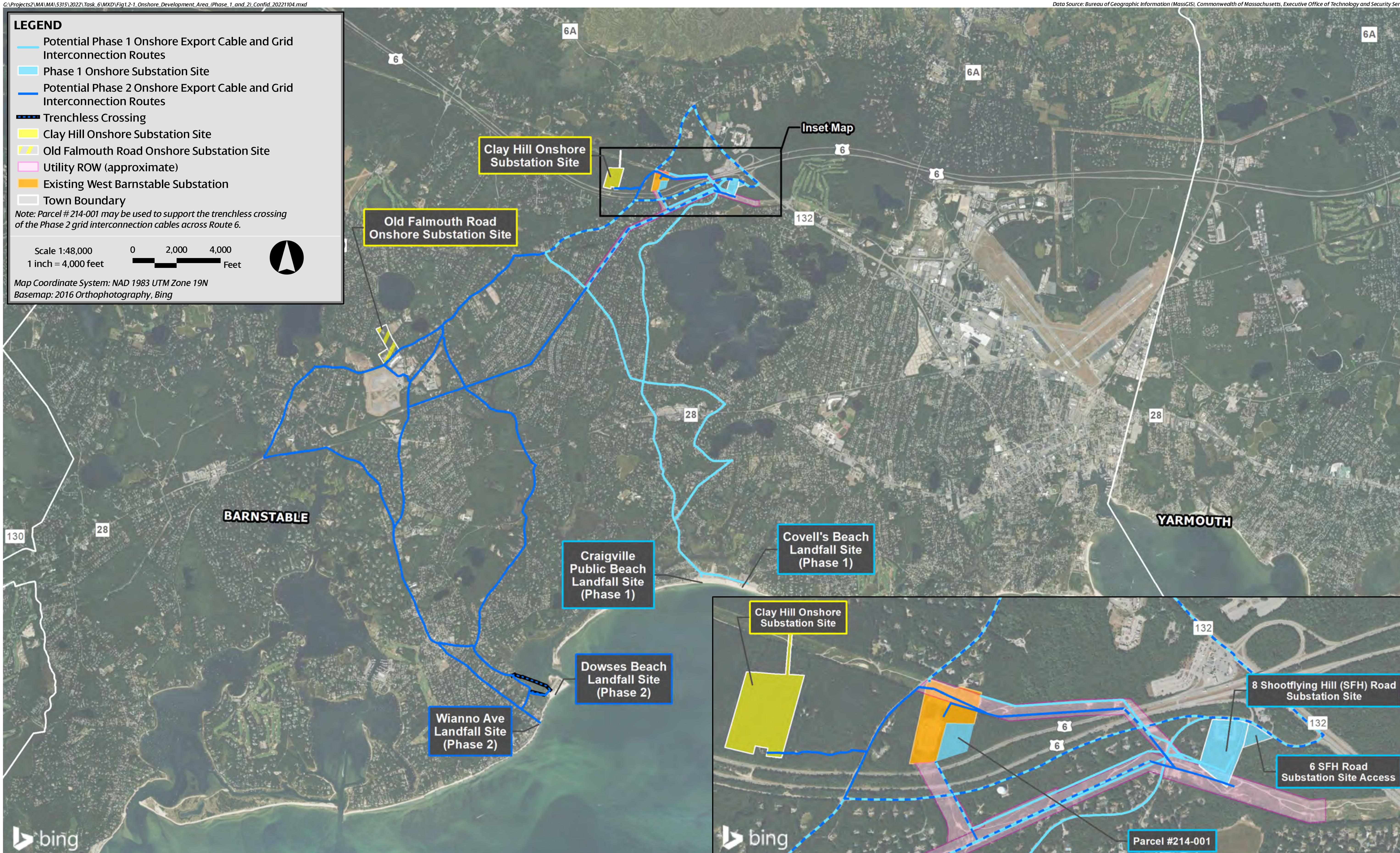
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services




New England Wind

AVANGRID RENEWABLES

**Figure 1.2-1**

*Overview of Existing Terrestrial Archaeology Survey Areas for Phases 1 and 2*

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Archaeological monitoring is recommended and planned for Phase 1 onshore construction activities within the staging areas required for HDD at the selected landfall site and during installation of Onshore Export Cable and other facilities (splice vaults) within the identified zones of high and moderate archaeological sensitivity in the Phase 1 Onshore Development Area. An intensive survey of archaeologically sensitive portions of the proposed substation site at 8 Shootflying Hill Road and Parcel #214-001 was recommended and was subsequently conducted as described in the following paragraph.

In October 2021, an intensive archaeological survey was conducted at four locations: (1) 6 Shoot flying Hill Road, (2) 8 Shootflying Hill Road, (3) Parcel #214-001, and (4) at trenchless crossing entry and exit locations for the Centerville River crossing (including 2 Short Beach Road) and potential work areas along Craigville Beach Road north and south of Centerville River. Pre-contact Native American material was identified within testing locations at the proposed substation parcel at 8 Shootflying Hill Road, the proposed trenchless crossing entry/exit pit location in Parcel 214, and at the proposed trenchless crossing entry bore and temporary work zone at 2 Short Beach Road. The pre-contact Native American find spots and site identified in the proposed substation at 8 Shootflying Hill Road, trenchless crossing entry bore and temporary work zone at 2 Short Beach Road and proposed entry/exit pit in Parcel 214 are not considered to be significant cultural resources.

No additional archaeological investigations are recommended or planned for the 8 Shootflying Hill Road Find Spot, 2 Short Beach Road Find Spot, and the Parcel 214 Site. No pre-contact cultural materials, faunal remains, or subsurface features such as shell midden or refuse pits associated with Site 19-BN-253 were found in test pits within the proposed trenchless crossing exit pit and 400-ft long pipe laydown area on the east side of Craigville Beach Road. Therefore, no additional archaeological investigations of these components of the onshore cabling route are recommended or planned. Archaeological monitoring of other components of New England Wind within areas of moderate or high archaeological sensitivity will be conducted during construction.

**Phase 2**

In June 2020, a due diligence review was completed for the Phase 2 Onshore Routing and Substation Envelope in Barnstable, Massachusetts. This review was completed prior to the identification of specific landfall sites and Onshore Export and Grid Interconnection Cable Routes for Phase 2, so the review was focused on a broad area in Barnstable. The due diligence report includes an inventory of recorded pre-contact, contact, and post-contact period archaeological sites (grouped by physiographic setting) and provides information about the types, nature, and distribution of archaeological resources located within the study area.

Results of archival research identified no archaeological properties listed in the National Register of Historic Places in the Phase 2 Onshore Routing and Substation Envelope. A total of 42 pre-contact archaeological sites and 15 post-contact archaeological sites were identified within the study area. Further consultation with the Massachusetts Historical Commission (MHC) and local federally recognized Tribes regarding the potential for New England Wind to affect both known and un-recorded cultural resources that may be present within the study area was recommended.

In November 2021, an archaeological reconnaissance survey was conducted for the Phase 2 Onshore Development Area (as shown on Figure 1.2-1). The reconnaissance survey included the: (1) landfall sites, (2) Onshore Export Cable Routes and Grid Interconnection Routes, and (3) the grid interconnection point at the West Barnstable Substation. The exact location of the Phase 2 onshore substation site(s) was not determined at the time of the survey, but the site(s) were anticipated to be located generally along the onshore routes included in these studies. An archaeological sensitivity assessment was prepared for the Phase 2 Onshore Development Area and zones of low, moderate, and high archaeological sensitivity were identified. Archaeological monitoring is recommended for Phase 2 onshore construction activities within the staging areas at the landfall site(s) and during installation of Onshore Export Cable and other components (duct banks, splice vaults) within the identified zones of high and moderate archaeological sensitivity in the Phase 2 Onshore Development Area.

In April 2022 an additional due diligence study was conducted for two potential onshore substation sites for Phase 2 (the Clay Hill onshore substation site and the Old Falmouth Road onshore substation site). No archaeological sites are recorded within the two potential substation sites. However, zones of high and moderate archaeological sensitivity are present in both potential substation parcels (see Appendix B for sensitivity maps). An intensive survey of archaeologically sensitive portions of the proposed substation sites is recommended and is planned to be conducted as described in Section 2.0.

During the design phase of New England Wind, avoidance and minimization of potential adverse effects to terrestrial archaeological resources were considered and implemented through measures such as sighting the Onshore Export Cable Routes and Grid Interconnection Routes within existing ROWs and along existing roadway layouts to the extent feasible. The archaeological surveys conducted for Phase 1 and Phase 2 Onshore Development Areas identified areas of moderate and high archaeological sensitivity and as recommended, the Proponent plans to conduct monitoring during construction in these areas. No further investigations are recommended for those areas subjected to an intensive survey.

Figure 1.2-1 indicates where terrestrial archaeology survey for Phase 1 and Phase 2 of New England Wind have been completed. Section 2.1.2 describes the limited locations where additional terrestrial archaeology survey is needed.

**Summary**

With the exception of monitoring moderate and high sensitivity areas during construction, the Proponent has completed all terrestrial archaeological investigations for the Phase 1 PAPE and the results of which have been incorporated into the TARA. Accordingly, Phase 1 archaeological surveys and results are not discussed in the remainder of this Phased Identification Plan (PIP) for Terrestrial Archaeology.

The following sections of this PIP focus on the outstanding terrestrial archaeological survey and reporting needs for the Phase 2 PAPE. A Phase 1B intensive archaeological survey is needed at the proposed Phase 2 onshore substation site(s) (see Figure 1.3-1). In addition, based on ongoing design, the Proponent has identified additional route segments and potential additional parcels near the onshore substation, which will require additional archaeological survey. These proposed survey areas are further discussed in Section 2.1.2 and are shown shaded in yellow in Figure 1.3-1. All other Phase 2 terrestrial survey activities have been completed.

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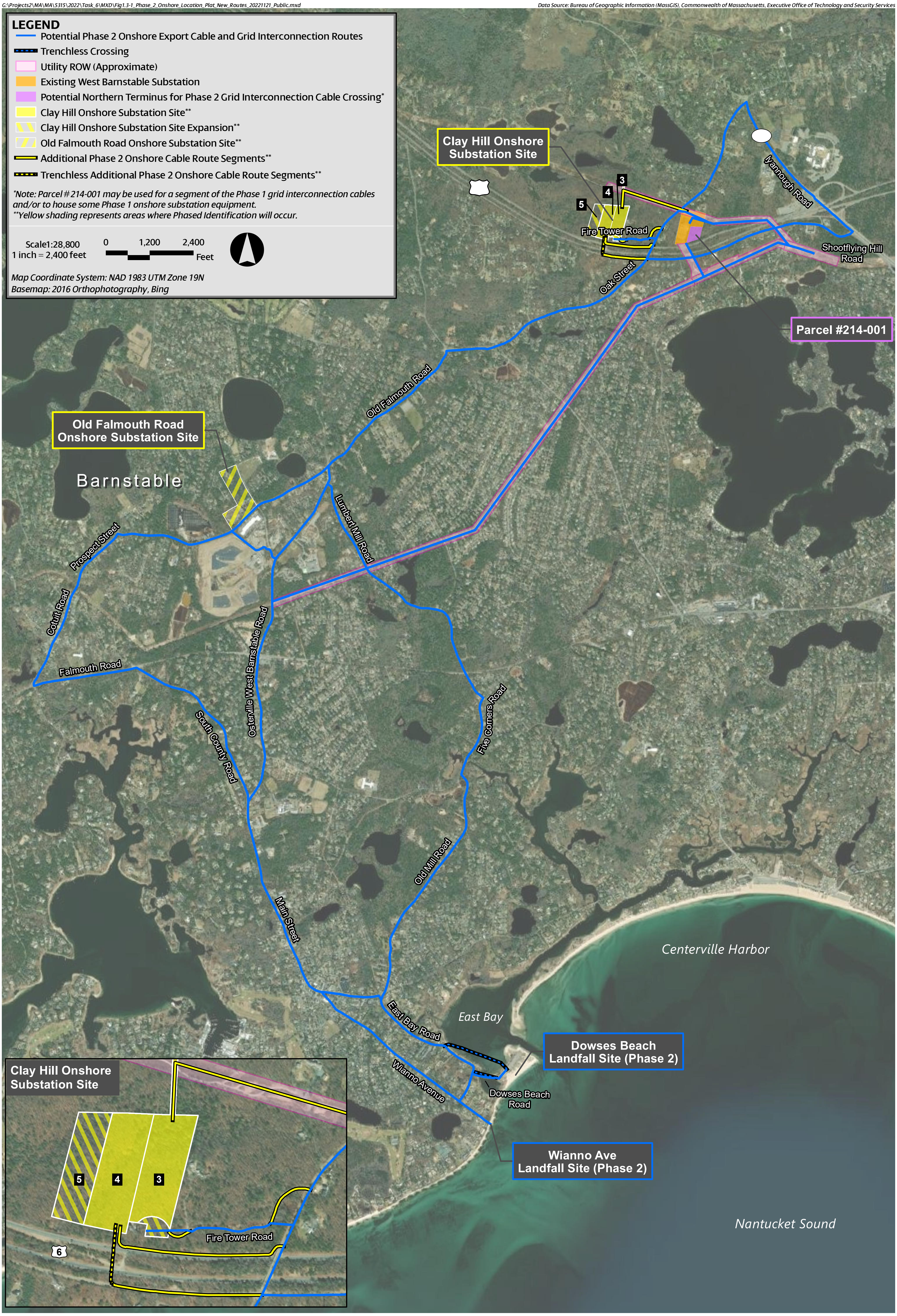




**Figure 1.3-1**
*Overview of Preliminary APE and Terrestrial Archaeology Survey Areas for Phase 2*

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# 2.0 PHASED IDENTIFICATION

## 2.1 Section 106 Phased Identification Plan (PIP)

### *2.1.1 Pre-Record of Decision (ROD) Phased Identification*

Prior to the publication of the FEIS, issuance of the ROD and/or adoption of a Memorandum of Agreement (MOA), phased identification will occur for the following select areas of the terrestrial PAPE:

- the Phase 2 onshore substation site(s)
- additional Onshore Export Cable and Grid Interconnection Route segments

These phased identification activities and associated Section 106 Consultation will be completed prior to the FEIS; the schedule is further described in Section 2.2.

### *2.1.2 Scope of Phased Identification*

**Overview**

As detailed above, all Phase 1 terrestrial archaeology assessments were completed in December 2021 and several terrestrial archaeology assessments have also been completed for Phase 2. A PIP is necessary for the Phase 2 onshore substation site(s) because the Proponent does not yet have site control and was previously unable to access the onshore substation site(s) to complete fieldwork. Based on ongoing design the Proponent is evaluating expansion of the boundary of the Clay Hill onshore substation site from the two adjacent parcels evaluated in April 2022 (Barnstable Assessors Parcels 195-005 and 195-006; referred to as “Parcels 3 and 4”).

The western boundary of the Clay Hill onshore substation site has been expanded to include a third parcel to the west (Barnstable Assessors Parcel 195-037; referred to as “Parcel 5”) and to include the southern portion (approximately 0.5 acres) of Parcel 3 (Barnstable Assessors Parcel 194-016). The site was expanded to provide additional flexibility for substation design and equipment layout, including to potentially minimize noise and visual impacts to sensitive receptors. Parcels 3, 4, and 5, which together total approximately 20.6 acres, are located north of Route 6 (Mid-Cape Highway) (Figure 1.3-1). The three parcels are underdeveloped and wooded. Recently, the Proponent executed an agreement that provides the ability to access all three parcels (Parcels 3, 4, and 5) and the Phase 1B survey is planned for this fall (see Section 2.2).

The Proponent does not have site control or the ability to access the Old Falmouth Road onshore substation site and currently does not expect to use this site. In the unlikely event that the Proponent plans to utilize the Old Falmouth Road onshore substation site, a Phase 1B survey would be conducted in accordance with the schedule in Section 2.2.

As part of the ongoing design, the Proponent recently completed a detailed and comprehensive construction feasibility study of the Onshore Export Cable and Grid Interconnection Routes for Phase 2. This study led to the identification of limited new onshore cable route segments in the immediate vicinity of the Clay Hill onshore substation site that may need to be used to address potential constructability considerations (these are referred to as the "Additional Phase 2 Onshore Cable Route Segments"). Figure 1.3-1 identifies these additional segments. A Phase 1A Study and, if needed, a Phase 1B study are expected to be completed in accordance with the schedule in Section 2.2.

The Additional Phase 2 Onshore Cable Route Segments are each 0.15 to 0.86 km (0.09 to 0.54 miles) long. Onshore export and grid interconnection cables are expected to primarily be installed in an underground duct bank (i.e., an array of plastic conduits encased in concrete) within public roadway layouts and utility ROWs.

**Description of Survey Types and Methods**

A Phase 1B study will be completed at the expanded Clay Hill onshore substation site (i.e., at Parcels 3, 4, and 5). Archaeological investigations of the substation parcels will occur in zones of high and moderate sensitivity with shovel test pits placed at 10-m intervals along judgmentally placed transects. Some test pits will be placed in zones of low archaeological sensitivity to confirm that ranking.

In the unlikely event that the Proponent needs to use the Old Falmouth Road onshore substation site, a Phase 1B survey would also be conducted at this site.

A Phase 1A Survey will be completed to evaluate the Additional Phase 2 Onshore Cable Route Segments (see Figure 1.3-1). Where access is possible, the Additional Phase 2 Onshore Cable Route Segments will be examined more closely by walkover survey/ground inspection and judgmental use of soil auger coring. Environmental characteristics such as physical conditions of the site, the degree of natural or human disturbance, proximity to sensitive resources such as estuarine environments, among others, will be documented. If the Phase 1A Survey indicates that a Phase 1B survey is needed, it will be conducted according to the schedule in Section 2.2.

As part of the planned Phase 1A and 1B Surveys, National Registry of Historic Places (NRHP) eligibility determinations and assessments of effects will be completed.

**Unanticipated Discoveries Plan**

The Proponent has prepared a plan for unanticipated discoveries (see "Procedures Guiding the Discovery of Unanticipated Archaeological Resources and Human Remains" in Appendix III-G of the COP). This plan will be followed and implemented during all planned studies described in this PIP.

## 2.2 Schedule

The Phase 1B study for the Clay Hill onshore substation site (Parcels 3, 4, and 5) and the Phase 1A study of the Additional Phase 2 Onshore Cable Route Segments are planned to occur this fall, with the report submitted to BOEM in November/December 2022. Upon review of the report and acceptance by BOEM, results will be circulated to consulting parties.

If the Phase 1A Survey of the Additional Phase 2 Onshore Cable Route Segments indicates that a Phase 1B survey is needed, it will be conducted prior to the FEIS.

In the unlikely event that the Proponent needs to use the Old Falmouth Road onshore substation site, a Phase 1B survey will be conducted prior to the FEIS. Should the Proponent identify additional parcels as potential onshore substation sites at a later date, archaeological survey and Section 106 Consultation will be conducted in a manner consistent with this Phased Identification Plan and/or in accordance with stipulations in a forthcoming MOA.

Table 2.2-1 provides the anticipated NEPA/Section 106 milestones, including actions led by BOEM and actions led by the Proponent.

**Table 2.2-1 Anticipated NEPA/Section 106 Milestones**

| Upcoming NEPA/Section 106 Milestones | |
|---|---|
| Cultural Reports Distributed to Section 106 Consulting Parties | December 2022 |
| Completion of Outstanding Archaeological Surveys | November 2022 |
| Draft Environmental Impact Statement Published | Anticipated December 23, 2022 |
| TARA Addendum Submitted for BOEM Review | December 2022 |
| TARA Addendum Submitted to Section 106 Consulting Parties | February 2023 |
| Potential TARA Addendum Consultation Meeting- | February 2023 |
| Section 106 Consulting Party Review of TARA Addendum Closes | March 2023 (30-day review period) |
| Final Environmental Impact Statement Published | Anticipated September 22, 2023 |
| Record of Decision | Anticipated October 20, 2023 |

## APPENDIX A REQUIRED ENVIRONMENTAL PERMITS

### Table 1 Required Environmental Permits for New England Wind

| Agency/ Regulatory Authority | Permit/Approval | Phase 1 Status (as of November 2022) | Phase 2 Status (as of November 2022) |
|---|---|---|---|
| **Federal Permits/Approvals** | | | |
| Bureau of Ocean Energy Management (BOEM) | Site Assessment Plan (SAP) approval[2] | Completed. | Completed. |
| | Construction and Operations Plan (COP) approval/Record of Decision (ROD) | COP filed with BOEM July 2, 2020 | COP filed with BOEM July 2, 2020 |
| | National Environmental Policy Act (NEPA) Environmental Review | Initiated by BOEM June 30, 2021 | Initiated by BOEM June 30, 2021 |
| | Consultation under Section 7 of the Endangered Species Act with National Marine Fisheries Service (NMFS) and US Fish and Wildlife Service (USFWS), coordination with states under the Coastal Zone Management Act (CZMA), government-to-government tribal consultations, consultation under Section 106 of the National Historic Preservation Act (NHPA), and consultation with NMFS for Essential Fish Habitat (EFH). | To be initiated by BOEM | To be initiated by BOEM |
| | Facility Design Report (FDR) and Fabrication and Installation Report (FIR) | To be filed (TBF) | TBF |
| US Environmental Protection Agency (EPA) | EPA Permits under Section 316(b) of the Clean Water Act (CWA), including National Pollutant Discharge Elimination System (NPDES) Permit(s) | TBF | TBF |
| | OCS Air Permit | Initial application filed October 7, 2022 | Initial application filed October 7, 2022 |
| US Army Corps of Engineers (USACE) | CWA Section 404 Permit (Required for side-casting of dredged material and placement of foundations, scour protection, and cable protection) | Application Filed August 1, 2022 | Application Filed August 1, 2022 |

[2] A meteorological-oceanographic buoy (metocean buoy) was installed in Lease Area OCS-A 0501 (prior to its segregation into Lease Areas OCS-A 0501 and OCS-A 0534) under an approved SAP in May 2018.

**Table 1 Required Environmental Permits for the Project (Continued)**

| Agency/ Regulatory Authority | Permit/Approval | Phase 1 Status (as of November 2022) | Phase 2 Status (as of November 2022) |
|---|---|---|---|
| **Federal Permits/Approvals** | | | |
| | Rivers and Harbors Act of 1899 Section 10 Individual Permit (Required for all offshore structures and dredging activities) | | |
| US National Marine Fisheries Service (NMFS) | Letter of Authorization (LOA) or Incidental Harassment Authorization (IHA) | Application considered adequate and complete July 20, 2022 | Application considered adequate and complete July 20, 2022 |
| US Coast Guard (USCG) | Private Aid to Navigation (PATON) authorization | TBF | TBF |
| Federal Aviation Administration (FAA) | No Hazard Determination (for activities at construction staging areas and vessel transits, if required) | TBF | TBF |
| **ISO New England** | | | |
| ISO New England (ISO-NE) | Interconnection Authorization | Interconnection request under review | Interconnection request(s) under review. |
| **State Permits/Approvals** | | | |
| Massachusetts Environmental Policy Act (MEPA) Office | Certificate of the Secretary of Energy and Environmental Affairs on the Final Environmental Impact Report | Environmental notification form (ENF) filed on June 11, 2020<br><br>Draft Environmental Impact Report (DEIR) submitted March 19, 2021 (Certificate received June 25, 2021).<br><br>Final Environmental Impact Report (FEIR) filed December 15, 2021 (Certificate received January 28, 2022) | Environmental notification form (ENF) filed on September 30, 2022 |
| Massachusetts Energy Facilities Siting Board (EFSB) | G.L. ch. 164, § 69 Approval | Petition filed on May 28, 2020 | Petition filed on November 1, 2022 |
| Massachusetts Department of Public Utilities (DPU) | G.L. ch. 164, § 72, Approval to Construct<br>G.L. ch. 40A, § 3 Zoning Exemption (if needed) | Petitions filed on May 28, 2020 | Petition filed on November 1, 2022 |

**Table 1 Required Environmental Permits for the Project (Continued)**

| Agency/ Regulatory Authority | Permit/Approval | Phase 1 Status (as of November 2022) | Phase 2 Status (as of November 2022) |
|---|---|---|---|
| **State Permits/Approvals** | | | |
| Massachusetts Department of Environmental Protection (MassDEP) | Chapter 91 Waterways License and Dredge Permit/ Water Quality Certification (Section 401 of the CWA) | Application filed May 5, 2022 | TBF |
| | Approval of Easement (Drinking Water Regulations)[3] | N/A | TBF (if needed) |
| Massachusetts Division of Marine Fisheries (DMF) | Letter of Authorization and/or Scientific Permit (for surveys and pre-lay grapnel run) | TBF | TBF |
| Massachusetts Department of Transportation (MassDOT) | Non-Vehicular Access Permits | TBF | TBF |
| | Rail Division Use and Occupancy License (if needed) | TBF (if needed) | TBF (if needed) |
| Massachusetts Board of Underwater Archaeological Resources (MBUAR) | Special Use Permit | Special Use Permit 17-003 Renewal Application submitted December 20, 2020<br><br>Permit 17-003 renewal approved February 26, 2021 (issued to Gray & Pape[4]). | Special Use Permit 17-003 Renewal Application submitted December 20, 2020<br><br>Permit 17-003 renewal approved February 26, 2021 (issued to Gray & Pape[4]). |
| Natural Heritage and Endangered Species Program (NHESP) | Conservation and Management Permit (if needed) | Massachusetts ESA Determination issued April 1, 2022 with conditions and will not result in a Take of state-listed species | TBF (if needed) |
| Massachusetts Historical Commission (MHC) | Archaeological Investigation Permits (950 CMR § 70.00) | Reconnaissance survey permit application filed May 4, 2020<br><br>State Archaeologist's Permit #4006 for Reconnaissance Survey issued May 12, 2020<br><br>State Archaeologist's Permit #4006 amended and extended March 2, 2021 (issued to PAL[5]). | Intensive survey permit application filed August 18, 2022<br><br>State Archaeologist's Permit #4227 for Intensive Survey issued October 4, 2022 (issued to PAL[5]). |

3 Not required for Phase 1, which does not cross any Zone 1 areas. An Approval of Easement could be required for Phase 2 if a Phase 2 onshore route passes through a Zone I area.

4 Gray & Pape's archaeological work is on behalf of Park City Wind LLC.

5 PAL's archaeological work is on behalf of Park City Wind LLC.

**Table 1 Required Environmental Permits for the Project (Continued)**

| Agency/ Regulatory Authority | Permit/Approval | Phase 1 Status (as of November 2022) | Phase 2 Status (as of November 2022) |
|---|---|---|---|
| **State Permits/Approvals** | | | |
| Massachusetts Office of Coastal Zone Management (CZM)/ Rhode Island Coastal Resources Management Council (CRMC) | Federal Consistency Determination (15 CFR § 930.57) | Included as Appendix III-S of the COP<br><br>MA CZM review initiated September 14,2022<br>RI CRMC review initiated August 5, 2022 | Included as Appendix III-S of the COP.<br><br>MA CZM review initiated September 14,2022<br>RI CRMC review initiated August 5, 2022 |
| **Regional Permits/Approvals** | | | |
| Cape Cod Commission (Barnstable County) | Development of Regional Impact (DRI) Review | Application filed June 10, 2022 | TBF |
| Martha's Vineyard Commission (MVC) | DRI Review | Application filed June 17, 2022 | TBF |
| **Local Permits/Approvals** | | | |
| Barnstable Conservation Commission | Order of Conditions (Massachusetts Wetlands Protection Act and municipal wetland non zoning bylaws) | NOI filed April 29, 2022 | TBF |
| Barnstable Department of Public Works (DPW) and/or Town Council | Street Opening Permits/Grants of Location | TBF | TBF |
| Barnstable Planning/Zoning | Zoning approvals as necessary | TBF | TBF |
| Edgartown Conservation Commission | Order of Conditions (Massachusetts Wetlands Protection Act and municipal wetland non-zoning bylaws) | NOI filed March 23, 2022 | TBF |
| Nantucket Conservation Commission | Order of Conditions (Massachusetts Wetlands Protection Act and municipal wetland non-zoning bylaws) | Order of Conditions issued May 16, 2022. | TBF |
| Mashpee Conservation Commission | Order of Conditions (Massachusetts Wetlands Protection Act and municipal wetland non-zoning bylaws) (if needed) | N/A | TBF (if needed) |

# Appendix B Sensitivity Maps at Onshore Substation Sites

Note: Appendix B provides the sensitivity maps of the onshore substation sites evaluated in April 2022. The Clay Hill onshore substation site was subsequently expanded, and Figure 1.3-1 provides an overview of the substation expansion and additional proposed terrestrial archaeology survey areas.

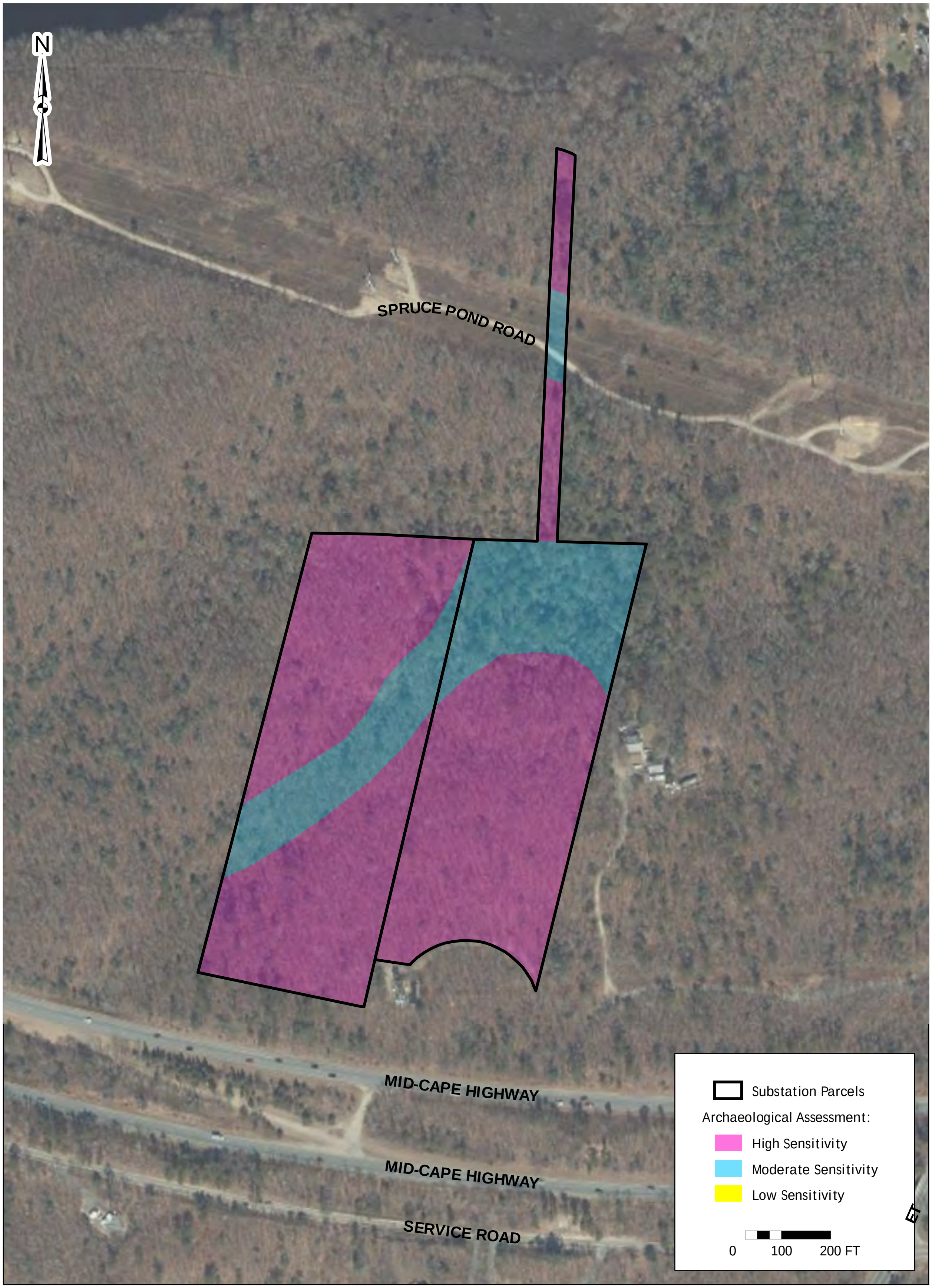


**Figure 3. Clay Hill Substation Parcels with zones of archaeological sensitivity.**

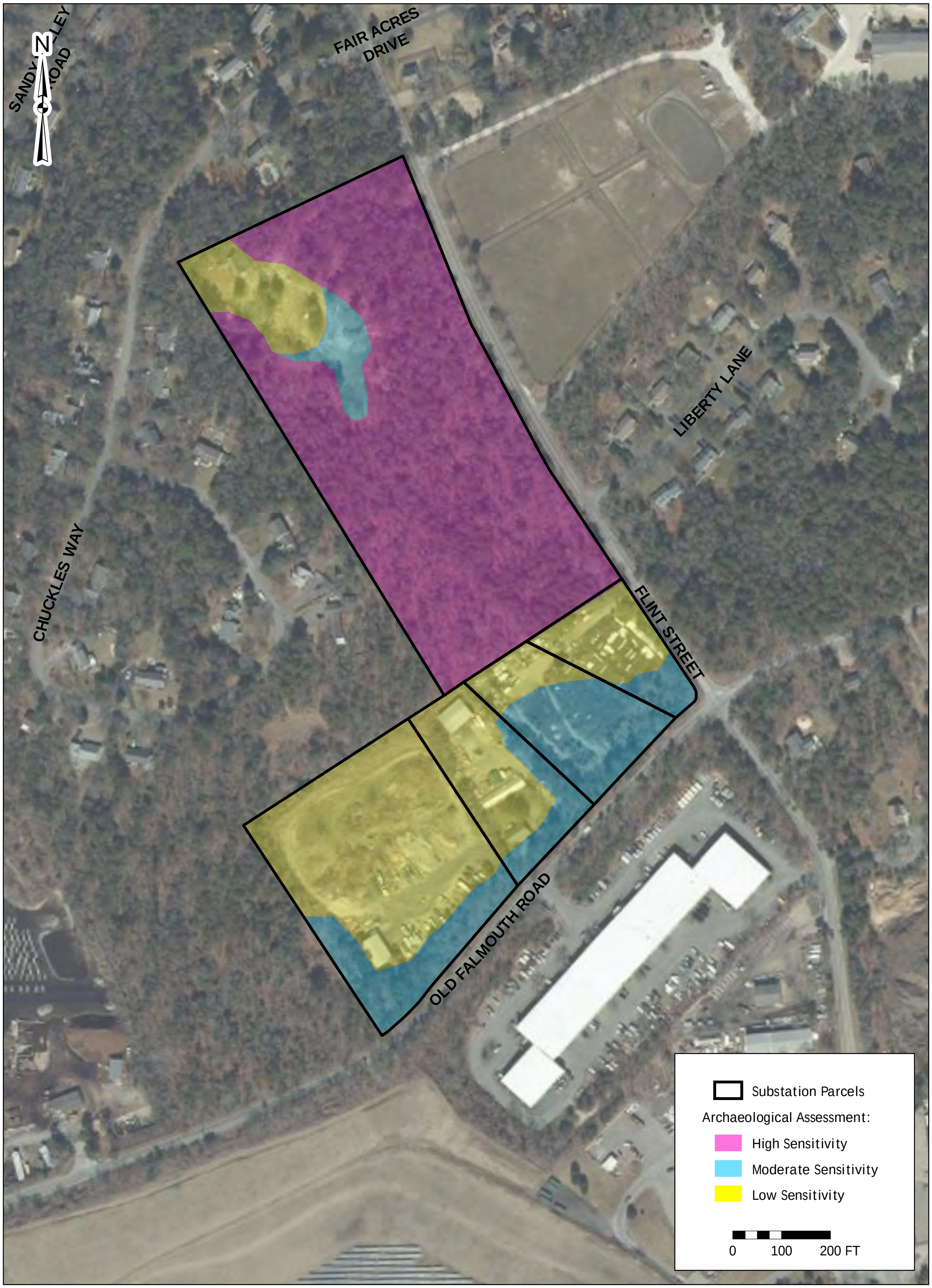


**Figure 4. Old Falmouth Road Substation Parcels with zones of archaeological sensitivity.**

ATTACHMENT 11 – NEW ENGLAND WIND TERRESTRIAL UNANTICIPATED DISCOVERY PLAN

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## New England Wind Phase 1 and Phase 2 Onshore Cabling Route and Substation New England Wind Offshore Wind Energy Project`

**Barnstable, Massachusetts**

# Procedures Guiding the Discovery of Unanticipated Archaeological Resources and Human Remains

Prepared for

**Park City Wind LLC**

Prepared by

**The Public Archaeology Laboratory, Inc.**
**26 Main Street**
**Pawtucket, Rhode Island 02860**

Public Archaeology Laboratory

**February 2022**

(revised August 2022)

## Introduction

Park City Wind LLC (the "Proponent") is proposing to develop offshore renewable wind energy facilities in Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and onshore operations and maintenance (O&M) facilities (herein referred to as "New England Wind" or the "Project"). Lease Area OCS-A 0534 is in federal waters south of Martha's Vineyard and Nantucket and has been designated by the Bureau of Ocean Energy Management (BOEM) for offshore wind energy development.

New England Wind will be developed in two Phases. Phase 1 of New England Wind, also known as Park City Wind, will deliver 804-megawatts (MW) of power via export cables that will make landfall within paved parking areas at either Craigville Public Beach or Covell's Beach in Barnstable, Massachusetts. From the Phase 1 landfall site, onshore export cables (installed primarily within an underground duct bank) will deliver power to an onshore substation to be constructed on a 6.7 acre parcel located at 8 Shootflying Hill Road. From the new onshore substation, grid interconnection cables will connect the substation to the grid interconnection point at the existing West Barnstable Substation. Phase 2, also known as Commonwealth Wind, will deliver 1,200-1500 MW of power via export cables that will make landfall at Dowses Beach and/or Wianno Avenue in Barnstable, Massachusetts. Onshore export cables (connecting the landfall site[s]to the Phase 2 onshore substation site[s]) and grid interconnection cables (connecting the substation[s] to the grid interconnection point at the existing West Barnstable Substation) are also expected to be installed underground, within public roadway layouts and utility rights-of-way (ROW). The properties needed for the Phase 2 onshore substation site(s) have not yet been secured. If technical, logistical, grid interconnection, or other unforeseen issues arise that preclude one or more Phase 2 export cables from interconnecting at the West Barnstable Substation, the Proponent may use the South Coast Variant of the Offshore Export Cable Corridor to interconnect at a second grid interconnection point along the South Coast of Massachusetts.

The Proponent is committed to the protection and preservation of cultural resources, in accordance with federal and state legislation, and is continuing that commitment during the construction of the upland terrestrial elements of New England Wind including the upland cabling route and the substation (Appendix A). The Proponent recognizes that while sections of the onshore cabling route and substation parcels have previously been subject to archaeological investigations and other areas were previously disturbed by existing utilities and buildings, it is possible that significant archaeological resources and/or human remains may be discovered during construction activities, particularly during excavation. The Proponent also recognizes the importance of compliance with federal, state, and municipal laws and regulations regarding the treatment of human remains, if any are discovered.

The Public Archaeology Laboratory Inc. ("PAL") is assisting the Proponent in the implementation of this Plan and the procedures guiding the unanticipated discovery of cultural resources and human remains detailed herein. The procedures will be implemented for two separate phases of work. During installation of the onshore cabling under roadways and in rights-of-way, in areas designated as having moderate and high archaeological sensitivity, an archaeologist will be on-site monitoring construction. Therefore, some of the notification procedures outlined below will be streamlined. In areas where archaeological investigation has been completed, such as the substation and entry/exit pits for trenchless crossings, an archaeologist will not be present and all the notification procedures outlined below will be in effect. These procedures were developed in consultation with the Massachusetts Historical Commission ("MHC"), office of the State Historic Preservation Officer ("SHPO") and federally recognized Indian tribes. These procedures summarize the approach that the Proponent will use to address unanticipated discoveries of archaeological resources or human remains within the Project's Area of Potential Effect ("APE").

**Standards/Guidelines and Laws/Regulations for Post-Review Discoveries of Archaeological Resources and Human Remains**

## *Federal*

- Section 106 of the National Historic Preservation Act of 1966, as amended (54 USC 300101) and Advisory Council on Historic Preservation implementing regulations (36 CFR 800).
- Secretary of the Interior's Standards for Archeology and Historic Preservation (48 CFR 44716-42);
- Advisory Council on Historic Preservation (ACHP): *Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects*, Advisory Council February 23, 2007).

## *Massachusetts*

- Massachusetts Unmarked Burial Law (M.G.L. c. 7, s. 38A, c. 38, s.6, c. 9, ss. 26A & 27C, and c.114, s.17);
- Massachusetts SHPO: *Know How #4 What to do when Human Burials are Uncovered* (no date) (Appendix B);
- Massachusetts Historical Commission *Policy and Guidelines for Non-Native Human Remains Which Are Over 100 Years Old or Older* (1990); M.G.L. Chapter 9, Section 26A (7) (Appendix C).

## Consultation with Federal and State Agencies and Indian Tribes

As part of the Project, Park City Wind LLC has been consulting with the Massachusetts SHPO, the federally recognized Indian tribes, the Mashpee Wampanoag Tribe and the Wampanoag Tribe of Gay Head/Aquinnah, and other interested stakeholders. All contact information for the SHPO, federally recognized Indian tribes, and other stakeholders is in this Post-Review Discoveries Plan. In the event any archaeological resources and/or human remains are encountered during construction of the Project, the Proponent and their Cultural Resources Manager ("CRM") will contact the relevant parties, as set forth in these Procedures.

## *Identification/Training*

Basic training is required to identify potential archaeological sites. Park City Wind LLC and its employees and contractors should have a basic understanding of the types of archaeological resources that could be present in the onshore section of the project. All Project inspectors, Resident Engineers, and Construction Supervisors working on the Project's onshore excavation activities will be given basic training in archaeological site recognition by qualified PAL staff.

The purpose of this training will be to review the Proponent's commitments regarding cultural resources compliance and provide an overview of the general cultural history of the Project area, so that the Proponent and contractor's personnel will be aware of the kinds of archaeological resources that may be encountered during construction. In addition, the training program will emphasize the exact protocol to be followed, as outlined in these Procedures, regarding actions to be taken and notification required in the event of a discovery, such as human remains, during construction. The MHC's fact sheet entitled "Know How #4 What to Do When Human Burials are Uncovered" will be distributed (Appendix B).

The training will be designed to ensure that New England Wind personnel and construction contractors involved in excavation activities for the onshore portion of New England Wind understand the extent of the archaeological surveys performed to date. The training will also review the distinction between archaeological sites that have been located and "cleared" under the cultural resource management process and any new discoveries that may occur during the construction process.

## *Notification Procedures*

The following section details the protocols that will be followed in the event that archaeological resources or human remains are discovered during the construction process.

### Archaeological Discovery Protocol

The following procedures will be adhered to in the event of a potential discovery of archaeological resources during construction.

1. In the event that suspected archaeological resources are uncovered during a construction activity, that activity shall immediately be halted until it can be determined whether the resources are cultural and, if so, whether they represent a potentially significant site.

2. The Contractor will immediately notify the Resident Engineer of the potential discovery. Notification will include the specific construction area (e.g., trench wall, spoil pile, foundation excavation) in which the potential site is located.

3. The Resident Engineer will direct a Stop Work order to the Contractor's Site Foreman to flag or fence off the archaeological discovery location and direct the Contractor to take measures to ensure site security. Any discovery made on a weekend or overnight hours will be protected until all appropriate parties are notified of the discovery. The Contractor will not restart work in the area of the find until the Resident Engineer has granted clearance.

4. The Resident Engineer will indicate the location and date of the discovery on the project plans and will undertake a site visit or otherwise coordinate an on-site archaeological consultation.

5. Upon notification or discovery of a possible archaeological site, the Resident Engineer will contact the Proponent's cultural resource consultants (PAL), who will in turn be responsible for determining whether a visit to the area is required. That determination may be made by viewing photographs of any object or soil discolorations sent to the archaeologist in combination with a verbal description from the Resident Engineer. If a site visit is necessary, the archaeologist will have a crew on site within 24 hours after notification.

   If on-site archaeological investigations are required, PAL will inform the Resident Engineer who then will inform the construction contractor. BOEM will also be notified of the need to conduct archaeological investigations. No construction work at the discovery site that could affect the archaeological resource will be performed until the archaeological fieldwork is complete. The site will be flagged as being off-limits for work but will not be identified as an archaeological site *per se* in order to protect the resources.

6. If PAL determines a site visit is not required as the reported discovery is found to not be a potentially significant archaeological resource, PAL will notify the Resident Engineer who will then notify the contractor to resume work.

7. If PAL determines a site visit is required, the PAL archaeologist will conduct a review of the discovery site in accordance with MHC standards and guidelines. Since the area will have been partially disturbed by construction activities, the objective of cultural resource investigations will be to evaluate the discovery site quickly so that notifications and consultation can proceed. BOEM will also be notified of the results of the discovery and evaluation to facilitate consultations.

8. The archaeologist will determine, based on any cultural materials or subsurface features found and the cultural sensitivity of the area in general, whether the site is potentially significant and requires immediate notification of the SHPO by telephone. If not, information about the site will be faxed or sent by express mail to the SHPO in order to ensure a quick site clearance. The Proponent and PAL will work with the SHPO to ensure that a treatment plan for the site is developed and implemented as quickly as possible. BOEM will also be notified about the transmittal of information on the archaeological site to the SHPO.

9. If the site is determined to be a significant archaeological resource threatened by onshore development for New England Wind, PAL, at the direction of the Proponent and in consultation with the SHPO, BOEM and as appropriate, Indian tribes and any other relevant consulting parties, will develop and implement under a State Archaeologist's permit (950 CMR 70) a site mitigation plan.

Duration of any work stoppages will be contingent upon the significance of the identified archaeological resource(s) and consultation with Proponent, SHPO, and other appropriate parties to determine the appropriate measures to avoid, minimize, or mitigate any adverse effects to the site.

## Discovery of Human Remains Protocol

If any human remains are to be encountered, they will likely be discovered in excavations, possibly below areas where previous ground disturbance (e.g., road construction, existing utilities) has occurred.

At all times human remains must be treated with the utmost dignity and respect. Human remains and/or associated artifacts will be left in place and not disturbed. No skeletal remains or materials associated with the remains will be collected or removed until appropriate consultation has taken place and a plan of action has been developed.

1. If any personnel on the construction site identify human remains or possible human remains, all construction work in the immediate vicinity that could affect the integrity of the remains will cease immediately. The remains should not be touched, moved, or further disturbed. The Resident Engineer will be informed immediately and notified of the exact location of the remains, as well as of the time of discovery. The Resident Engineer will direct a Stop Work order to the Contractor's Site Foreman to take measures to ensure site security.

2. The Resident Engineer will be responsible for immediately contacting the PAL archaeologist.

3. The PAL archaeologist and Park City Wind LLC will be responsible for notifying appropriate company personnel as well as the State Archaeologist, the Office of the Chief Medical Examiner (OCME), the State Police, and BOEM. If the PAL archaeologist determines that the remains are obviously human and recent, this will be communicated to all the contacts, including the OCME. If the PAL archaeologist considers that the remains appear to be over 100 years old, this will be indicated to the OCME, and the State Archaeologist so that they can coordinate and respond. The State Archaeologist will determine if the remains are Native American and if so, will notify the Massachusetts Commission on Indian Affairs.

4. Park City Wind LLC, BOEM staff, and the State Archaeologist will consult with the property owner and the Commission on Indian Affairs if the remains are Native American, to 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 Special Permit (950 CMR 70.20[2]) granted by the State Archaeologist after review of an adequate data recovery plan that specifies a qualified research team and an appropriate research design (950 CMR 70.11[2]), including a proposal for disposition of the remains that is consistent with the results of consultation.

5. If the remains are non-Native, the State Archaeologist will determine whether a skeletal analysis of the remains will be conducted and whether the remains will be deposited in a curatorial facility or reinterred. These decisions will be made in consultation with BOEM and other interested parties as defined in the *Policy and Guidelines for Non-Native Human Remains Which Are Over 100 Years Old or Older* (MHC 1990) (Appendix C).

6. In all cases, due care will be taken in the excavation and subsequent transport and storage of the remains to ensure their security and respectful treatment.

## CONTACTS

***State Police***
Appropriate State Police Barracks
Phone: 911
**Medical Examiner**

***Massachusetts Office of the Chief Medical Examiner***
720 Albany Street
Boston, Massachusetts 02118
**Contact:** Mindy Hull, MD, Chief Medical Examiner
Phone: (617) 267-6767

***State Historic Preservation Office***
**Massachusetts Historical Commission**
220 Morrissey Boulevard
Boston, Massachusetts 02125
**Contact:** Brona Simon, State Archaeologist and SHPO
Tel: (617) 727-8470
brona.simon@state.ma.us

***Massachusetts Commission on Indian Affairs***
100 Cambridge Street, Suite 300
Boston, Massachusetts 02114
**Contact:** John A. Peters, Jr., Executive Director
Phone: (617) 573-1292
Email: john.peters@state.ma.us

### Federally Recognized Tribal Contacts

***Mashpee Wampanoag Indian Tribe***
Tribal Historic Preservation Department

483 Great Neck Rd. South,
Mashpee, MA 02649

**Contact**: David Weeden, Deputy Tribal Historic Preservation Officer
Phone: (508) 447-0208, ext. 102
Email: dweeden@mwtribe.com

***Wampanoag Tribe of Gay Head (Aquinnah)***
20 Black Brook Road
Aquinnah, Massachusetts 02535

**Contact**: Bettina M. Washington, Tribal Historic Preservation Officer
Phone: (508) 560-9014
Email: thpo@wampanoagtribe-nsn.gov

Federal Agency

***Bureau of Ocean Energy Management***
***Office of Renewable Energy Programs***
45600 Woodland Road, VAM-OREP
Sterling, VA.20166

**Contact** : Laura Kate Schnitzer, Archaeologist
Email: laura.schnitzer@boem.gov

## Project Proponent

***Park City Wind, LLC***

**Contact**: Maria Hartnett
Phone: (410) 451-9766
Email: mHartnett@epsilonassociates.com>

## Cultural Resource Consultant

***The Public Archaeology Laboratory, Inc.***
26 Main Street
Pawtucket, RI 02860

**Contact**: Deborah C. Cox. President
Phone: 401-487-4002/401-728-8780
Email: dcox@palinc.com

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# ATTACHMENT 12 – NEW ENGLAND WIND UNANTICIPATED DISCOVERIES PLAN FOR SUBMERGED ARCHAEOLOGICAL RESOURCES

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New England Wind

AVANGRID RENEWABLES

# Construction and Operations Plan

Lease Area OCS-A 0534

## Volume II-D Appendices

November 2022


Submitted by
Park City Wind LLC

Submitted to
Bureau of Ocean Energy Management
45600 Woodland Rd
Sterling, VA 20166

Prepared by
Epsilon Associates, Inc.


# New England Wind Construction and Operations Plan for Lease Area OCS-A 0534

# Volume II-D Appendices

*Submitted to:*
BUREAU OF OCEAN ENERGY MANAGEMENT
45600 Woodland Rd
Sterling, VA 20166

*Submitted by:*
Park City Wind LLC

*Prepared by:*
Epsilon Associates Inc.

*In Association with:*

| | |
|---|---|
| Baird & Associates | JASCO Applied Sciences |
| Biodiversity Research Institute | Public Archaeology Laboratory, Inc. |
| Capitol Air Space Group | RPS |
| Geo SubSea LLC | Saratoga Associates |
| Geraldine Edens, P.A. | SEARCH, Inc. |
| Gray & Pape | Wood Thilsted Partners Ltd |

November 2022

# APPENDIX H:

# UNANTICIPATED SUBMERGED ARCHAEOLOGICAL DISCOVERIES PLAN

# UNANTICIPATED DISCOVERIES OF ARCHAEOLOGICAL SITES, HISTORIC SITES, AND SUBMERGED CULTURAL RESOURCES, INCLUDING HUMAN REMAINS

New England Wind is the proposal to develop offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and onshore operations and maintenance (O&M) facilities. Park City Wind LLC, a wholly owned subsidiary of Avangrid Renewables, LLC, is the Proponent of this undertaking and will be responsible for the construction, operation, and decommissioning of New England Wind. New England Wind constitutes a federal undertaking with the potential to affect submerged historic properties and is therefore subject to consultation under Section 106 of the National Historic Preservation Act (NHPA) (Title 54 U.S.C. § 306108). A preliminary area of potential effects (PAPE) was developed for the purposes of preparing a marine archaeological resources assessment (MARA) report. The PAPE for submerged portions of the proposed project covers an approximately 411–453 square kilometers (km2) (101,590–111,939 acres) in size depending upon the final footprint of Vineyard Wind 1.

Although a robust MARA was conducted, it is impossible to ensure that all cultural resources were discovered within the submerged portions of New England Wind. 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, operations and maintenance, and decommissioning. This Unanticipated Discoveries Plan (UDP) is subject to revisions based on consultations with interested parties and the provisions of any Memorandum of Agreement that may be executed for the Project pursuant to Section 106 of the National Historic Preservation Act or the Act's implementing regulations at 36 CFR Part 800. The implementation of the final UDP will be overseen by a qualified marine archaeologist (QMA), as designated by the Proponent, who meets or exceeds the Secretary of the Interior's *Professional Qualifications Standards* for archaeology.

If unanticipated 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 in accordance with all safety procedures and emergency shut down protocols and every effort will be made to avoid or minimize impacts to the cultural resource(s).
2) The marine contractor or other responsible party shall immediately notify the Proponent of the discovery.
3) The Proponent shall evaluate the nature of the discovery and will retain the services of a qualified marine archaeologist to assist in such evaluations and associated consultations.
4) The Proponent shall keep the location of the discovery confidential and take no action that may adversely affect the archaeological resource until BOEM has made an evaluation and instructs the applicant on how to proceed.
5) The Proponent shall conduct additional investigations as directed by BOEM to determine if the resources is eligible for listing in the National Register of Historic Places (30 CFR 585.802(b)).
6) Per Lease Stipulation 4.2.7.2, BOEM shall be notified of the potential archaeological resource within 24 hours of the discovery. The Proponent shall also notify the State Historic Preservation Officer (SHPO) of Massachusetts, the State Archaeologist and the Tribal Historic Preservation Officers (THPOs) or other designated representatives of the consulting tribal governments.
7) Per Lease Stipulation 4.2.7.3, within 72 hours of the discovery, the Proponent shall issue a report

in writing to BOEM providing available information concerning the nature and condition of the cultural resource and observed attributes relevant to the resource's potential eligibility for listing in the National Register of Historic Places. If the discovery is in state waters, MBUAR and MHC will be notified in writing.

8) The Proponent shall consult with BOEM, as feasible, to obtain technical advice and guidance for the evaluation of the discovered cultural resource.
9) If the impacted resource is determined by BOEM to be National Register eligible, a mitigation plan shall be prepared by the Proponent for the discovered cultural resource. This plan must be reviewed by BOEM prior to submission to the SHPOs and tribal representatives for their review and comment. The consulting parties are expected to respond with preliminary comments within two working days, with final comments to follow as quickly as possible.
10) Per Lease Stipulation 4.2.6, the Proponent may not impact a known archaeological resource without prior approval from BOEM. No development activities in the vicinity of the cultural resource will resume until either a mitigation plan is executed or, if BOEM determines a mitigation plan is not warranted, BOEM provides written approval to Park City Wind, LLC to resume construction.

Should the Proponent designate persons to serve as Onboard Representatives on each vessel during bottom-disturbing activities, training and resources will be produced to ensure the Onboard Representatives can identify potential submerged cultural resources. If training is elected, it will occur prior to all bottom-disturbing activities. Unanticipated discoveries are possible during any bottom-disturbing activities including anchoring and recovery, pre-construction surveys, visual inspections/seafloor imaging, etc. Any materials encountered (except potential human remains) should be photographed and placed immediately into seawater in a clean container that can be sealed. No photographs shall be taken of any potential human remains.

If human remains are encountered:

1. All work in the near vicinity of the human remains should cease and reasonable efforts should be made to avoid and protect the remains from additional impact. In cases of inclement weather, any recovered human remains should be protected with tarpaulins.
2. The State Police Detectives at the local District Attorney's Office, Office of the Chief Medical Examiner, State Archaeologist, Director of the MBUAR, and the Environmental Police should be immediately notified by the Proponent as to the findings.
3. A qualified professional archaeologist should be retained to investigate the reported discovery, inventory the remains and any associated artifacts, and assist in coordinating with 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 SHPO, and if applicable, appropriate Indian 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.

**Notification Points of Contact** (to be updated annually)**:**

**Office of the Chief Medical**
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## ATTACHMENT J-2: ENTITIES INVITED TO BE CONSULTING PARTIES

The following is a list of governments and organizations that BOEM contacted and invited to be a consulting party to the NHPA Section 106 review of the New England Wind Project (formerly Vineyard Wind South) between June 2021 and April 2022. During the consultations, additional parties were made known to BOEM and were added as they were identified (Attachment J-3). All counties and municipalities listed below are in Massachusetts unless otherwise specified.

- Advisory Council on Historic Preservation (ACHP)
- Alliance to Protect Nantucket Sound
- Avangrid
- Bureau of Safety and Environmental Enforcement
- Cape Cod Commission
- Non-federally recognized historic Massachusetts Chappaquiddick Tribe of the Wampanoag Nation
- City of New Bedford
- City of Fall River
- Connecticut Department of Economic and Community Development, State Historic Preservation Office
- County of Barnstable
- County of Bristol
- County of Dukes
- Cultural Heritage Partners
- The Delaware Nation
- Delaware Tribe of Indians
- Gay Head Lighthouse Advisory Board
- Historic District Commission (Nantucket)
- Maria Mitchell Association (Dark Skies Initiative)
- Martha's Vineyard Commission
- Mashantucket (Western) Pequot Tribal Nation
- Mashpee Wampanoag Tribe of Massachusetts
- Massachusetts Board of Underwater Archaeological Resources
- Massachusetts Commission on Indian Affairs
- Massachusetts Historical Commission
- Mohegan Tribe of Indians of Connecticut
- Nantucket Conservation Foundation
- Nantucket Historical Association
- Nantucket Historical Commission
- Nantucket Planning Commission
- Nantucket Preservation Trust
- Narragansett Indian Tribe
- National Oceanic and Atmospheric Administration, Habitat and Ecosystem Services Division
- National Park Service
- Office of the Deputy Assistant Secretary of the Navy for Environment
- Preservation Massachusetts
- Rhode Island Historical Preservation & Heritage Commission
- The Shinnecock Indian Nation
- Town of Aquinnah
- Town of Barnstable
- Town of Barnstable Historical Commission
- Town of Chilmark
- Town of Dartmouth
- Town of Dighton
- Town of Edgartown
- Town of Fairhaven
- Town of Falmouth

- Town of Gosnold
- Town of Nantucket
- Town of Oak Bluffs
- Town of Tisbury
- Town of West Tisbury
- Town and County of Nantucket (via their counsel)
- Trustees, Martha's Vineyard and Nantucket
- U.S. Environmental Protection Agency
- U.S. Federal Aviation Administration
- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers
- U.S. Coast Guard
- U.S. Department of Defense
- Vineyard Power Cooperative
- Vineyard Wind
- Wampanoag Tribe of Gay Head (Aquinnah)

## ATTACHMENT J-3: CONSULTING PARTIES TO THE NEW ENGLAND WIND PROJECT

The following is a current list of consulting parties to the NHPA Section 106 review of the New England Wind Project, as of April 22, 2022.

- Advisory Council on Historic Preservation (ACHP)
- Alliance to Protect Nantucket Sound
- Bureau of Safety and Environmental Enforcement
- Cape Cod Commission
- County of Dukes
- County of Bristol
- Gay Head Lighthouse Advisory Board
- Martha's Vineyard Commission
- Mashantucket (Western) Pequot Tribal Nation
- Mashpee Wampanoag Tribe of Massachusetts
- Massachusetts Board of Underwater Archaeological Resources
- Massachusetts Historical Commission
- Nantucket Historical Commission (withdrew July 26, 2021)
- National Park Service
- Office of the Deputy Assistant Secretary of the Navy for Environment
- Park City Wind
- Rhode Island Historical Preservation & Heritage Commission
- Town of Nantucket (withdrew July 26, 2021)
- Town of Barnstable, Historical Commission
- U.S. Army Corps of Engineers
- U. S. Environmental Protection Agency
- Wampanoag Tribe of Gay Head (Aquinnah)

Some of the parties consulted over the course of the NHPA Section 106 review have voluntarily withdrawn from further participation in the consultation, as indicated by the withdrawal date in parentheses for each of those parties.

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# Appendix K
# References Cited

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# Appendix L
# Glossary

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## Table of Contents



## List of Tables

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# L Glossary

**Table L-1: Glossary**

| Term | Definition |
|---|---|
| affected environment | Environment as it exists today that could be potentially impacted by the proposed Project |
| automatic identification system | Automatic tracking system used on vessels to monitor ship movements and avoid collision |
| algal blooms | Rapid growth of the population of algae, also known as algae bloom |
| allision | A moving ship running into a stationary ship |
| animat | Computer-simulated animals that follow known species-specific behaviors to model impacts on real animals |
| anthropogenic | Generated by human activity |
| archaeological resource | Historical place, site, building, shipwreck, or other archaeological site on the American landscape |
| ballast | Material used to improve stability of a vessel or other vehicle or structure |
| ballast tank | Vessel compartment used to hold water to improve stability |
| ballast water | Water carried by a ship in its ballast tank to improve stability |
| 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 |
| bilge | Area where the bottom curve of a ship's hull meets the vertical sides |
| biogenic structure | Structures generated by biological organisms |
| 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 |
| 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 |
| cultural resource | Historical districts, objects, places, sites, buildings, shipwrecks, and archaeological sites on the American landscape, as well as sites of traditional, religious, or cultural significance to cultural groups, including Native American tribes |
| culvert | Structure, usually a tunnel, allowing water to flow under an obstruction (e.g., road, trail) |
| planned activities | Impacts that could result from the incremental impact of a specific action, such as the proposed Project, when combined with other past, present, or future actions or other projects; can occur from individually minor but collectively significant actions that take place over time |
| 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 |
| delphinids | Oceanic dolphins |
| demersal | Living close to the ocean floor |
| Project design envelope | The range of proposed Project characteristics defined by the applicant and used by 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 pipes encased in concrete |

| Term | Definition |
|---|---|
| ecosystem | Community of interacting living organisms and non-living components (such as air, water, soil) |
| electrical service platform | The interconnection point between the wind turbine generators and the export cable; the necessary electrical equipment needed to connect the 66 kilovolt inter-array cable to the 220 kilovolt offshore export cables |
| electromagnetic field | A field of force produced by electrically charged objects and containing both electric and magnetic components |
| embayment | Recessed part of a shoreline |
| endangered species | A species that is in danger of extinction in all or a significant portion of its range |
| ensonification | The process of filling with or exposing to sound |
| environmental consequences | The potential impacts that the construction, operations, and decommissioning of the proposed Project would have on the environment |
| environmental justice communities | Minority, low-income, and other populations affected by the proposed Project whose demographic characteristics make them potentially more vulnerable to impacts than other populations |
| epifauna | Fauna that lives on the surface of a seabed (or riverbed) or is attached to underwater objects or aquatic plants or animals |
| Endangered Species Act-listed species | Species listed under the Endangered Species Act of 1973 (as amended) |
| essential fish habitat | Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (50 Code of Federal Regulations Part 600) |
| export cables | Cables connecting the wind facility to the onshore electrical grid power |
| export cable corridor | Area identified for routing the entire length of the onshore and offshore export cables |
| federal 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 |
| finfish | Vertebrate and cartilanginous fishery species, not including crustaceans, cephalopds, 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) |
| geomagnetic | Relating to the magnetism of the Earth |
| gillnet | A vertically hanging fishnet that traps fish by their gills |
| hard-bottom habitat | Benthic habitats comprised of hard-bottom (e.g., cobble, rock, and ledge) substrates |
| historical resource | 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 |
| hypoxic event | Event related to a lack of adequate oxygen supply |
| impact-producing factor | Descriptions of the discrete ways in which an action or activity affects physical, biological, economic, or cultural resources |
| infauna | Fauna living in the sediments of the ocean floor (or river or lake beds) |
| inter-array cables | Cables connecting the wind turbine generators to the electrical service platforms |
| inter-link cables | Cables connecting the electrical service platforms to one another |
| invertebrate | Animal with no backbone |
| jacket foundation | Latticed steel frame with three or four supporting piles driven into the seabed |
| jack-up vessel | Mobile and self-elevating platform with buoyant hull |
| jet excavation | Process of moving or removing soil with a jet |
| jet plowing | Plowing in which the jet plow, with an adjustable blade, or plow rests on the seafloor and is towed by a surface vessel; the jet plow creates a narrow trench at the designated depth while water jets fluidize the sediment within the trench; in the case of the proposed Project, the cables would be feed through the plow and laid into the trench as it moves forward; the fluidized sediments then settle back down into the trench and bury the cable |
| knot | Unit of speed equaling 1 nautical mile per hour |

| Term | Definition |
|---|---|
| landfall site | The shoreline landing site at which the offshore cable transitions to onshore |
| 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 |
| monopile or monopile foundation | A long steel tube driven into the seabed that supports a tower |
| nacelle | The portion of the wind turbine generator that houses the electrical generating components |
| nautical mile | A unit used to measure sea distances and equivalent to approximately 1.15 miles |
| odontocete | A kind of cetacean characterized by the presence of teeth, also called toothed whales |
| onshore substation | Substation connecting the proposed Project to the existing bulk power grid system |
| operations facilities | Includes 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 a foundation akin to a pole |
| pile driving | Installing foundation piles by driving them into the seafloor |
| pinnipeds | Carnivorous, semiaquatic marine mammals with fin, also known as seals |
| pin pile | Small-diameter pipe driven into the ground as foundation support |
| plume | Column of fluid moving through another fluid |
| private aids to navigation | Visual references on structures positioned in or near navigable waters of the U.S., including radar transponders, lights, sound signals, buoys, and lighthouses, that support safe maritime navigation; permits for the aids are administered by the U.S. Coast Guard |
| Project area | The combined onshore and offshore area where proposed Project components would be located |
| protected species | Endangered or threatened species that receive federal protection under the Endangered Species Act of 1973 (as amended) |
| RI/MA Lease Areas | Combination of all BOEM Renewable Energy Lease Areas offshore Rhode Island and Massachusetts |
| 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 |
| scrublands | Plant community dominated by shrubs and often also including grasses and herbs |
| sessile | Attached directly by the base |
| silt substrate | Substrate made of a granular material originating from quartz and feldspar, and whose size is between sand and clay |
| 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 |
| Southern Wind Development Area | The area within which the wind turbine generators, electrical service platforms, and associated cables for the proposed Project would be installed, specifically all of BOEM Renewable Energy Lease Area OCS-A 0534 and the portion of Lease Area OCS-A 0501 not used for the Vineyard Wind 1 Project |
| splice vault | Underground concrete transition vault that to be constructed at the landfall site and inside of which the 220-kilovolt alternating current offshore export cables would be connected to the 220 kilovolt onshore export 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 suspended 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 |
| tidal flushing | Replacement of water in an estuary or bay because of tidal flow |

| Term | Definition |
|---|---|
| trailing suction hopper dredge | A ship that is used to maintain waterways in navigable condition by virtue of being able to pump sand, clay, silt, and gravel; the ship trails its suction pipe, and a pump system sucks up a mixture of sand or soil and water, and discharges it in the hopper, or hold of the vessel; once fully loaded, the vessel sails to the unloading site |
| 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 |
| utility right-of-way | Registered easement on private land that allows utility companies to access the utilities or services located there |
| 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 turbine generator | Component that puts out electricity in a structure that converts kinetic energy from wind into electricity |

BOEM = Bureau of Ocean Energy Management

# Appendix M
# List of Preparers and Reviewers

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## Table of Contents



## List of Tables



## Abbreviations and Acronyms

| | |
|---|---|
| CSA | CSA Ocean Sciences, Inc |
| ERM | Environmental Resources Management, Inc. |
| NEPA | National Environmental Policy Act |

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# M List of Preparers and Reviewers

### Table M-1: Bureau of Ocean Energy Management Contributors

| Name | Role/Resource Area |
|---|---|
| **NEPA Coordinator** | |
| Crumpton, Christine | NEPA Coordinator |
| **Resource Scientists and Contributors** | |
| Baker, Arianna | Navigation and Vessel Traffic |
| Baker, Kyle | Marine Mammals, Sea Turtles |
| Bigger, David | Bats, Birds, Terrestrial Habitats and Fauna |
| Brune, Genevieve | Land Use and Coastal Infrastructure |
| Conrad, Alex | Marine Acoustics |
| Cornelison, Meghan | Environmental Justice |
| Crews, Christopher | Coastal Habitats and Fauna |
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| Hooker, Brian | Benthic Resources; Commercial Fisheries and For-Hire Recreational Fishing; Finfish, Invertebrates, and Essential Fish Habitat; Wetlands and Other Waters of the United States |
| Jensen, Mark | Demographics, Employment, and Economics; Recreation and Tourism; Commercial Fisheries and For-Hire Recreational Fishing |
| Jylkka, Zach | Project Coordinator |
| Klein, Kimberly | Marine Mammals, Sea Turtles |
| Krevor, Brian | NEPA Compliance |
| McCarty, John | Scenic and Visual Resources |
| McCoy, Angel | Other Uses (National Security and Military Use, Aviation and Air Traffic, Offshore Cables and Pipelines, Radar Systems, Scientific Research and Surveys, and Marine Minerals), Geographical Analysis Areas |
| McGuffin, Andrew | Geophysicist |
| Moshier, Marissa | Cultural Resources |
| Richards, Renee | Other Uses (National Security and Military Use, Aviation and Air Traffic, Offshore Cables and Pipelines, Radar Systems, Scientific Research and Surveys, and Marine Minerals) |
| Slayton, Ian | Air Quality |
| Stokely, Sarah | Cultural Resources |
| Sullivan, Kimberly | Environmental Justice |

NEPA = National Environmental Policy Act

### Table M-2: Reviewers

| Name | Title | Agency |
|---|---|---|
| Brown, William Y. | Chief Environmental Officer | Bureau of Ocean Energy Management |
| Morin, Michelle | Chief, Environment Branch for Renewable Energy | Bureau of Ocean Energy Management |
| Hildreth, Emily | Policy Analyst | Bureau of Ocean Energy Management |
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| Heckman, Andrea | Lead Environmental Protection Specialist | Bureau of Safety and Environmental Enforcement |
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| Jacek, Christine | Permit Project Manager | U.S. Army Corps of Engineers |

| Name | Title | Agency |
|---|---|---|
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| Timmerman, Timothy | Director | U.S. Environmental Protection Agency, Region 1 |
| Engler, Lisa Berry | Director | Massachusetts Office of Coastal Zone Management |
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| Ciochetto, David | Principal Ocean Engineer | Rhode Island Coastal Resources Management Council |

**Table M-3: Consultants**

| Name | Role/Resource Area | Company |
|---|---|---|
| **Project Management/Coordinators** | | |
| Heater, Heather | Partner-In-Charge, All Sections | ERM |
| Sussman, Ben | Project Manager, All Sections | ERM |
| Steffen, Bradley | Deputy Project Manager, All Sections | ERM |
| Stueber, Renee | Lead Document Manager / Technical Editor, All Sections | ERM |
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| Barkaszi, Mary Jo | Marine Mammals, Sea Turtles, National Marine Fisheries Service Biological Assessment | CSA |
| Blamer, Valerie | Wetlands and Other Waters of the United States, Bats, Birds, Coastal Habitats and Fauna, Terrestrial Habitats and Fauna, U.S. Fish and Wildlife Service Biological Assessment | ERM |
| Boswell, Leigh Ann | Senior Subject Matter Expert: Benthic Resources; Finfish, Invertebrates, and Essential Fish Habitat, Commercial Fisheries and For-Hire Recreational Fishing | ERM |
| Douglas, Robert | Benthic Resources | CSA |
| Enright, Troy | Air Quality | ERM |
| Graham, Bruce | Benthic Resources | CSA |
| Gifford, Kathleen | Water Quality | CSA |
| Gutierrez, Jeff | Senior Subject Matter Expert: Demographics, Employment, and Economics; Environmental Justice; Recreation and Tourism; Land Use and Coastal Infrastructure; Navigation and Vessel Traffic; Visual Impact Assessment | ERM |
| Hartigan, Kayla | Marine Mammals, National Marine Fisheries Service Biological Assessment | CSA |
| Hoffman, Haley | Seascape and Landscape Visual Impact Assessment, Cumulative Historic Resources Visual Effects Assessment | ERM |
| Huff, Jenifer | Land Use and Coastal Infrastructure, Recreation and Tourism | ERM |
| Liger, Annika | Cultural Resources, Finding of Adverse Effect, Cumulative Historic Resources Visual Effects Assessment | ERM |
| MacMorris, Tess | Navigation and Vessel Traffic | ERM |
| Martin, Tony | Finfish, Invertebrates, and Essential Fish Habitat; National Marine Fisheries Service Essential Fish Habitat Assessment | CSA |
| McCown, Virginia | Environmental Justice | ERM |
| McMahon, Adrianna | Benthic Resources | ERM |
| Robinson, Matthew | Scenic and Visual Resources, Seascape and Landscape Visual Impact Assessment, Cumulative Historic Resources Visual Effects Assessment | ERM |
| Steffen, Bradley | Senior Subject Matter Expert: U.S. Fish and Wildlife Service Biological Assessment, Birds, Bats, Marine Mammals, Sea Turtles | ERM |
| Stevens, Tara | Marine Mammals, National Marine Fisheries Service Biological Assessment | CSA |
| Thorpe, Monika | Geographic Information Systems | ERM |
| Tigelaar, John | Commercial Fisheries and For-Hire Recreational Fishing | CSA |
| Todorov, Melinda | Planned Activities Scenario, Navigation and Vessel Traffic | ERM |
| White, Casey | Air Quality; Demographics, Employment, and Economics; Other Uses (National Security and Military Use, Aviation and Air Traffic, Offshore Cables and Pipelines, Radar Systems, Scientific Research and Surveys, and Marine Minerals) | ERM |

CSA = CSA Ocean Sciences, Inc.; ERM = Environmental Resources Management, Inc.

# Appendix N
# List of Agencies, Organizations, and Persons to Whom Copies of the Statement Are Sent

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# Table of Contents



# List of Tables



# Abbreviations and Acronyms

| | |
|---|---|
| BOEM | Bureau of Ocean Energy Management |
| COP | construction and operations plan |
| EIS | environmental impact statement |

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# N List of Agencies, Organizations, and Persons to Whom Copies of the Statement Are Sent

This Environmental Impact Statement (EIS) is available in electronic form for public viewing at https://www.boem.gov/renewable-energy/state-activities/new-england-wind-formerly-vineyard-wind-south. Hard copies and DVDs of the EIS can be requested by contacting the Program Manager, Office of Renewable Energy in Sterling, Virginia. Publication of this draft EIS initiates a 60-day comment period where government agencies, members of the public, and interested stakeholders can provide comments and input. The Bureau of Ocean Energy Management (BOEM) will accept comments in any of the following ways:

- In hard copy form, delivered by hand or by mail, enclosed in an envelope labeled "New England Wind COP EIS" and addressed to Program Manager, Office of Renewable Energy, Bureau of Ocean Energy Management, 45600 Woodland Road, Sterling, Virginia 20166. Comments must be received or postmarked no later than February 6, 2023.
- Through the regulations.gov web portal by navigating to http://www.regulations.gov and searching for docket number "BOEM-2022-0047." Click the "Comment" button to the right of the document link. Enter your information and comment, then click "Submit."
- By attending one of the EIS public meetings at the locations and dates listed in the notice of availability and providing written or verbal comments. BOEM will use comments received during the public comment period to inform its preparation of the final EIS, as appropriate. EIS notification lists for the proposed Project are provided in Table N-1 through Table N-4.

**Table N-1: Federal Agencies**

| Agency | Contact | Location |
|---|---|---|
| **Federal Cooperating Agencies** | | |
| Bureau of Safety and Environmental Enforcement | Cheri Hunter<br>(571) 474-6969<br>cheri.hunter@bsee.gov | Sterling, Virginia |
| National Oceanic and Atmospheric Administration, National Marine Fisheries Service | Sue Tuxbury<br>(978) 281-9176<br>susan.tuxbury@noaa.gov | Gloucester, Massachusetts |
| U.S. Army Corps of Engineers | Christine Jacek<br>(978) 318-8026<br>(978) 578-7548<br>christine.m.jacek@usace.army.mil | Concord, Massachusetts |
| U.S. Coast Guard | George Detweiler<br>(202) 372-1566<br>George.H.Detweiler@uscg.mil<br><br>Michele DesAutels<br>michele.e.desautels@uscg.mil | Washington, D.C.<br><br><br><br>Boston, Massachusetts |
| U.S. Environmental Protection Agency | Timothy Timmermann<br>(617) 918-1025<br>Timmermann.Timothy@epa.gov | Boston, Massachusetts |
| **Federal Participating Agencies** | | |
| Advisory Council on Historic Preservation | Chris Daniel<br>(202) 517-0223<br>cdaniel@achp.gov | Washington, D.C. |

| Agency | Contact | Location |
|---|---|---|
| Federal Aviation Administration | Cindy Whitten<br>(816) 329-2528<br>Cindy.whitten@faa.gov | Washington, D.C. |
| National Park Service | Mary Krueger<br>(978) 342-2719<br>Mary_C_Krueger@nps.gov | Fitchburg, Massachusetts |
| U.S. Department of Defense | Steven Sample<br>(703) 571-0076<br>Steven.j.sample4.civ@mail.mil | Alexandria, Virginia |
| U.S. Department of the Navy | Matthew Senska<br>(703) 614-2201<br>Matthew.senska@navy.mil | Washington, D.C. |
| U.S. Fish and Wildlife Service | Jane Ledwin<br>(703) 358-2585<br>Jane_Ledwin@fws.gov | Falls Church, Virginia |
| **Tribal Cooperating Agencies** | | |
| Mashantucket (Western) Pequot Tribal Nation | Michael Kickingbear Johnson<br>mejohnson@mptn-nsn.gov | Mashantucket, Connecticut |

### Table N-2: State Agencies

| Agency | Contact | Location |
|---|---|---|
| **State Cooperating Agency** | | |
| New York State Department of State | Michael Snyder<br>518-474-6000<br>michael.snyder@dos.ny.gov | Albany, New York |
| **State Participating Agencies** | | |
| Commonwealth of Massachusetts; Massachusetts Office of Coastal Zone Management | Lisa Berry Engler<br>(617) 626-1230<br>lisa.engler@state.ma.us | Boston, Massachusetts |
| Rhode Island Coastal Resources Management Council | James Boyd<br>(401) 783-3370<br>jboyd@crmc.ri.gov | Wakefield, Rhode Island |
| State of Rhode Island; Rhode Island Department of Environmental Management | Terry Gray<br>(401) 222-2771<br>terry.gray@dem.ri.gov | Providence, Rhode Island |
| Connecticut State Historic Preservation Office, Connecticut Department of Economic and Community Development | Mary Dunne<br>(860) 500-2356<br>mary.dunne@ct.gov | Hartford, Connecticut |
| Rhode Island Historical Preservation & Heritage Commission | Jeffery Emidy<br>(401) 222-4134<br>jeffrey.emidy@preservation.ri.gov | Providence, Rhode Island |
| New York State Division for Historic Preservation | Tim Lloyd<br>(518) 268-2186<br>timothy.lloyd@parks.ny.gov | Waterford, New York |
| Massachusetts Historical Commission | Brona Simon<br>(617) 727-2816<br>brona.simon@sec.state.ma.us | Boston, Massachusetts |

**Table N-3: Tribes and Native Organizations**

| Tribe or Organization | State |
|---|---|
| Delaware Tribe of Indians | Delaware |
| Delaware Nation | Delaware |
| Mashantucket (Western) Pequot Tribal Nation | Connecticut |
| Mashpee Wampanoag Tribe of Massachusetts | Massachusetts |
| Mohegan Tribe of Indians of Connecticut | Connecticut |
| Narraganset Indian Tribe | Rhode Island |
| Shinnecock Indian Nation | New York |
| Wampanoag Tribe of Gay Head (Aquinnah) | Massachusetts |

**Table N-4: National Historic Preservation Act Section 106 Consulting Parties**

| Government or Organization | Consulting Party |
|---|---|
| Federal agencies | Advisory Council on Historic Preservation |
| | Bureau of Safety and Environmental Enforcement |
| | National Park Service |
| | Office of the Deputy Assistant Secretary of the Navy for Environment |
| | U.S. Army Corps of Engineers |
| | U. S. Environmental Protection Agency |
| Tribal government | Mashpee Wampanoag Tribe of Massachusetts |
| | Mashantucket (Western) Pequot Tribal Nation |
| | Wampanoag Tribe of Gay Head (Aquinnah) |
| State agencies | Massachusetts Board of Underwater Archaeological Resources |
| | Massachusetts Historical Commission (State Historic Preservation Office) |
| | Rhode Island Historical Preservation & Heritage Commission |
| Local government | Cape Cod Commission |
| | County of Dukes |
| | County of Bristol |
| | Martha's Vineyard Commission |
| | Town of Barnstable, Historical Commission |
| Nongovernmental organizations or groups | Alliance to Protect Nantucket Sound |
| | Gay Head Lighthouse Advisory Board |
| Applicant | Park City Wind, LLC |

**Table N-5: Libraries**

| Library | State |
|---|---|
| Aquinnah Public Library | Massachusetts |
| Boston Public Library | Massachusetts |
| Chilmark Free Public Library | Massachusetts |
| Edgartown Public Library | Massachusetts |
| Hyannis Public Library | Massachusetts |
| New Bedford Free Public Library | Massachusetts |
| Oak Bluffs Public Library | Massachusetts |
| Nantucket Atheneum | Massachusetts |
| Vineyard Haven Public Library | Massachusetts |
| West Tisbury Free Public Library | Massachusetts |
| Woods Hole Public Library | Massachusetts |
| Maury Loontjens Memorial Library | Rhode Island |

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