OCS EIS/EA
BOEM-2024-011

New England Wind Project

Final Environmental Impact Statement:

Appendices

March 2024

Estimated Lead Agency Total Costs to Prepare the Draft and Final Environmental Impact Statement: $2,444,536

U.S. Department of the Interior
Bureau of Ocean Energy Management

COVER SHEET

ENVIRONMENTAL IMPACT STATEMENT FOR THE NEW ENGLAND WIND PROJECT

Draft ()   Final (X)

Lead Agency: U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs

Cooperating Agencies: National Oceanic and Atmospheric Administration, National Marine Fisheries Service
U.S. Army Corps of Engineers
U.S. Coast Guard
U.S. Department of the Interior, Bureau of Safety and Environmental Enforcement
U.S. Department of the Interior, U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency

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Area of Potential Impact: Renewable Energy Lease Area OCS-A 0534

ABSTRACT

This Environmental Impact Statement (EIS) assesses the reasonably foreseeable impacts on physical, biological, socioeconomic, and cultural resources that could result from the construction and installation, operations and maintenance, and conceptual decommissioning of the New England Wind Project (Project) proposed by Park City Wind, LLC (Park City Wind), in its Construction and Operations Plan (COP). The proposed Project described in the COP and this Final EIS would be at least 2,036 megawatts in scale (and up to 2,600 megawatts) approximately 20 miles from the southwest corner of Martha's Vineyard and approximately 24 miles from Nantucket at its closest point, within the area of Renewable Energy Lease Number OCS-A 0534 (Lease Area). The proposed Project would serve demand for renewable energy in one or more New England states. This Final EIS was prepared in accordance with the requirements of the National Environmental Policy Act (42 U.S. Code 4321–4370f) and implementing regulations of the Council on Environmental Quality and the Department of the Interior. This Final EIS will inform the Bureau of Ocean Energy Management's decision on whether to approve, approve with modifications, or disapprove the proposed Project's COP. Publication of the Draft EIS initiated a 60-day public comment period, after which all the comments received were assessed and considered by the Bureau of Ocean Energy Management in the preparation for this Final EIS. Comments on the Draft EIS can be found in Appendix O.

Additional copies of this Final EIS may be obtained by writing the Bureau of Ocean Energy Management, Attn: Lindy Nelson (address above); by telephone at (571) 789-6485; or by downloading from the BOEM website at https://www.boem.gov/renewable-energy/state-activities/new-england-wind-formerly-vineyard-wind-south.

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Appendix A
Required Environmental Permits and Consultations

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Abbreviations and Acronyms

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
ESP	electrical service platform
ITA	Incidental Take Authorization
LOA	Letter 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
NOA	Notice of Availability
NOI	Notice of Intent
OECC	offshore export cable corridor
Project	New England Wind Project
ROD	Record of Decision
Secretary	Secretary of the Interior
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
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.

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, the Bureau of Ocean Energy Management (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 Revised COP filed June 28, 2021 Revised COP filed December 17, 2021 COP Addendum for Phase 2 OECC South Coast Variant filed April 22, 2022 Revised COP filed June 27, 2022 Revised COP filed August 9, 2023
	Site Assessment Plan Approval	Site Assessment Plan approved (for Lease Area OCS-A 0501) in May 2018
	NEPA Environmental Review	NOI published by BOEM June 30, 2021 Draft EIS issued December 23, 2022 Final EIS NOA published March 1, 2024
	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 and completed February 16, 2024 NMFS EFH consultation request submitted September 7, 2022 and completed October 20, 2023 USFWS ESA consultation initiated April 7, 2023 and completed September 28, 2023
BSEE	Oil Spill Response Plan	Provided as COP Appendix I-F
	Facility Design Report and Fabrication and Installation Report	To be filed
	Safety Management Plan	Provided as COP Appendix I-B
Federal Aviation Administration	No Hazard Determination (for activities at construction staging areas and vessel transits, if required)	To be filed
NMFS	Letter of Authorization[a]	Letter of Authorization request notice of receipt published in *Federal Register* August 22, 2022 Volume 87, Issue 161, p. 51345 Updated Letter of Authorization request notice of receipt published in *Federal Register* June 8, 2023 Volume 88, Issue 110, p. 37606

Agency/Regulatory Authority	Permit/Approval	Status
U.S. Army Corps of Engineers	CWA Section 404 Permit (required for fill activities in waters of the United States) 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 Complete Individual Permit Applications for Phase 1 and Phase 2 submitted December 8, 2022 Publication of Public Notices for Phase 1 and Phase 2 on December 23, 2022
USCG	Private Aid to Navigation authorization	To be filed
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	NOIs for Phase 1 and Phase 2 submitted January 28, 2022 Applications deemed complete on January 18, 2023 Public Notice issued for 38-day public comment on December 19, 2023
Regional		
ISO New England	Interconnection Authorization	Phase 1: interconnection request queue position #700 submitted December 15, 2017 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 Phase 2: Environmental notification form certificate issued December 9, 2022; Draft Environmental Impact Report certificate issued October 10, 2023
Massachusetts Energy Facilities Siting Board	General Law Ch. 164, § 69 Approval	Phase 1: Petition filed May 28, 2020; decision issued December 18, 2023 Phase 2: Petition filed November 1, 2022; Supplement filed May 12, 2023
Massachusetts Department of Public Utilities	General Law Ch. 164, § 72, Approval to Construct General Law Ch. 40A, § 3 Zoning Exemption (if needed)	Phase 1: Petitions filed May 28, 2020; decision issued December 18, 2023 Phase 2: Petition filed November 1, 2022
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; 401 Water Quality Certification issued May 12, 2023 Phase 2: To be filed
	Approval of Easement (Drinking Water Regulations)	Phase 1: Not applicable Phase 2: To be filed (if needed)

Agency/Regulatory Authority	Permit/Approval	Status
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 Special Use Permit 21-006 Renewal Application Approved April 6, 2023
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 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 Phase 1: Reconnaissance survey permit application filed May 4, 2020 State Archaeologist's Permit #4006 for Reconnaissance Survey issued May 12, 2020; amended and extended March 2, 2021 State Archaeologist's Permit #4101 issued June 14, 2021 Phase 2: Intensive survey permit application filed August 18, 2022 State Archaeologist's Permit #4227 for Intensive Survey issued October 4, 2022; amended and extended May 9, 2023
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 2023) Massachusetts Office of Coastal Zone Management consistency review began September 14, 2022; 3-month notice issued December 14, 2022; consistency decision issued November 9, 2023 Rhode Island Coastal Resources Management Council consistency review initiated August 5, 2022; 3-month notice issued November 3, 2022; consistency decision issued October 19, 2023
Massachusetts State Legislature	Article 97 of the Amendments of Massachusetts Constitution	Phase 1: Approval issued July 28, 2022 Phase 2: To be filed
Regional		
Cape Cod Commission (Barnstable County)	Development of Regional Impact Review	Phase 1: Application filed June 10, 2022; Development of Regional Impact approval decision issued May 11, 2023 Phase 2: To be filed

Agency/Regulatory Authority	Permit/Approval	Status
Martha's Vineyard Commission	Development of Regional Impact Review	Phase 1: Application filed June 17, 2022; Development of Regional Impact approval decision issued September 19, 2022 Phase 2: Filed December 13, 2023
Local		
Barnstable Conservation Commission	Order of Conditions (Massachusetts Wetlands Protection Act and municipal wetland non-zoning bylaws)	Phase 1: NOI filed April 29, 2022, Order of Conditions issued October 17, 2023 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; Superseding Order of Conditions issued by Massachusetts Department of Environmental Protection on May 16, 2023 Edgartown Wetland By-Law Permit issued by the Edgartown Conservation Commission September 13, 2023 Phase 2: Filed November 2,2023
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 Phase 2: Order of Conditions issued December 18, 2023

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; EIS = Environmental Impact Statement; ESA = Endangered Species Act; ESP = electrical service platform; LOA = Letter of Authorization; NEPA = National Environmental Policy Act; NHPA = National Historic Preservation Act; NMFS = National Marine Fisheries Service; NOA = Notice of Availability; NOI = Notice of Intent; OCS = Outer Continental Shelf; OECC = offshore export cable corridor; ROD = Record of Decision; USCG = U.S. Coast Guard; USEPA = U.S. Environmental Protection Agency; USFWS = U.S. Fish and Wildlife Service; WTG = wind turbine generator

[a] A revised LOA update memo was submitted to NMFS December 22, 2023, which provided updated information and modeling results for WTG and ESP installation methodologies including impact pile driving, vibratory pile setting, and drilling. Issuance of the LOA is anticipated after the Final EIS is published.

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 its jurisdiction by law and special expertise. The

[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.

reorganization of the Renewable Energy rules (30 CFR Parts 285, 585, and 586, enacted on January 31, 2023) reassigned existing regulations governing safety and environmental oversight and enforcement of Outer Continental Shelf (OCS) renewable energy activities from BOEM to BSEE.

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 (ESP), 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 (USACE) is serving as a cooperating agency pursuant to 40 CFR § 1501.8 because the scope of the Proposed Action and alternatives involves activities that could affect resources under 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). Under Section 404 of the CWA, USACE regulates the discharge of dredged or fill material into waters of the United States. The landward limit of jurisdiction in tidal waters (33 CFR § 328.4) extends to the high tide line, whereas the seaward limit is 3 nautical miles (3.5 miles), as measured from the baseline of the territorial seas. Under Section 10 of the Rivers and Harbors Act, USACE regulates the work and dredging from the mean high water line to the 3-nautical-mile (3.5 mile) limit and structures from the mean high water mark to the seaward limit of the OCS. 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 § 930.76. The proposed Project COP (Epsilon 2023) 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 requested consultation on the proposed activities considered in the Final EIS with both NMFS and USFWS for listed species under their respective jurisdictions. According to BOEM's Biological Assessments (BA) for the NMFS and USFWS, 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 initially submitted a BA for the proposed Project to NMFS and requested formal consultation under Section 7 of the ESA on September 7, 2022. A revised BOEM BA was submitted on May 8, 2023 (BOEM 2023). NMFS initiated consultation on June 15, 2023. The BOEM 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 NMFS Biological Opinion (BO). The scope of the BOEM BA and NMFS BO covers the entirety of potential effects on ESA-listed species and designated critical habitat associated with the proposed Project. The BOEM BA evaluated four marine 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 analysis of effects and conclusions of the final BO is incorporated by reference and summarized into the Final EIS. The BOEM 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 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 2023). An additional Information for Planning and Consultation report was run on April 13, 2023, due to the proposed listing of the tri-colored bat (*Perimyotis subflavus*), which has the potential to occur in the proposed Project area.

On December 23, 2022, BOEM submitted a BA to USFWS (BOEM 2022a) and requested formal consultation. On March 28, 2023, BOEM submitted an addendum to the BA with new analysis using the updated Stochastic Collision Risk Assessment for Movement model for USFWS-listed bird species. An additional addendum was submitted on July 7, 2023, to address the potential listing of the tri-colored bat anticipated for September 14, 2023. Formal consultation with USFWS was completed on September 28, 2023, with the issuance of a USFWS letter of concurrence and BO. The scope of the BOEM BA and USFWS BO covers the entirety of potential impacts on ESA-listed species and designated critical habitat associated with the proposed Project. The BOEM BA assessed the impacts of all aspects of the proposed Project, including construction, operation, maintenance, and decommissioning on all currently listed or proposed USFWS-listed species that have the potential to be affected by proposed Project activities. The analysis of impacts and conclusions of the final USFWS BO are incorporated by reference and summarized into the Final EIS. The BOEM BA is available at https://www.boem.gov/renewable-energy/state-activities/new-england-wind-formerly-vineyard-wind-south.

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 Notice of Intent (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 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 2022b) to cooperating agencies and Tribal Historic Preservation Officers.

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. An additional government-to-government meeting was held on March 23, 2023.

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 ESPs, 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 2022b), available on BOEM's Project-specific website, summarizes comments on historic preservation issues.[2]

The Section 106 regulations at 36 CFR § 800.8 provide for use of the NEPA substitution process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR §§ 800.3 through 800.6. This process is commonly known as "NEPA Substitution for Section 106," and BOEM is using this process and documentation required for the preparation of the EIS and the ROD to comply with Section 106. Appendix J of the Final EIS contains BOEM's Finding of Adverse Effect, which includes a description and summary of BOEM's consultation to date. On June 10, 2021, BOEM contacted ACHP and Massachusetts State Historic Preservation Officer to provide proposed Project information and notify of BOEM's intention to use the NEPA process to fulfill Section 106 obligations in lieu of the procedures set forth in 36 CFR §§ 800.3 through 800.6. BOEM will continue consulting with the Massachusetts State Historic Preservation Officer, ACHP, federally

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

recognized tribes, and the consulting parties regarding the Finding of Adverse Effect and the resolution of adverse effect.

BOEM conducted Section 106 consultation meeting(s) on the Finding of Adverse Effect and the resolution of adverse effects, and the agency has requested that the consulting parties review and comment on the Finding of Adverse Effect and proposed resolution measures. Five NHPA Section 106 consultation meetings were held virtually with consulting parties on March 3, 2022, February 8, 2023, June 15, 2023, September 14, 2023, and December 13, 2023. BOEM fulfilled public meetings process, pursuant to 36 § CFR 800.2(d)(3).

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.

On June 14, 2021, BOEM contacted representatives of local governments, state and local historical societies, and other federal agencies to solicit information on historic properties and determine their interest in participating as consulting parties. Participants that have accepted consulting party status for the NHPA Section 106 consultation are listed in Table A.2-1.

Table A.2-1: Participating Consulting Parties for National Historic Preservation Act Section 106 Consultation

Participants in the Section 106 Process	Participating Consulting Party
State Historic Preservation Officers and state agencies	Massachusetts Historical Commission, Massachusetts Board of Underwater Archaeological Resources Rhode Island Historical Preservation & Heritage Commission
Federal agencies	ACHP BSEE National Park Service U.S. Army Corps of Engineers U.S. Naval History and Heritage Command USEPA
Federally recognized tribes	Mashantucket (Western) Pequot Tribal Nation Mashpee Wampanoag Tribe of Massachusetts Wampanoag Tribe of Gay Head (Aquinnah)

Participants in the Section 106 Process	Participating Consulting Party
Local governments	Cape Cod Commission County of Dukes County of Bristol Martha's Vineyard 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) Town and County of Nantucket (withdrew August 27, 2020) Town of Barnstable, Historical Commission
Nongovernmental organizations or groups	Alliance to Protect Nantucket Sound Gay Head Lighthouse Advisory Board Maria Mitchell Association (Dark Skies Initiative); withdrew August 27, 2020 Nantucket Preservation Trust (withdrew August 27, 2020)

ACHP = Advisory Council on Historic Preservation; BSEE = Bureau of Safety and Environmental Enforcement; USEPA = U.S. Environmental Protection Agency

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 Final EIS and transmitted the findings of that EFH Assessment to NMFS on September 7, 2022, and was completed on October 20, 2023. The Final EIS summarizes and discusses the assessment's key findings and will incorporate the entire 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"

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

[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).

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 an initial 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 (Table A.1-1). 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 EIS, including public scoping, cooperating agency involvement, and distribution of the EIS for public review and comment.

A.2.3.1 Scoping

On June 30, 2021, BOEM issued an NOI to prepare an EIS consistent with the regulations implementing NEPA (42 USC § 4321 et seq.) to assess the potential impacts of the Proposed Action and alternatives (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. 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 Final EIS and used the comments to identify alternatives for analysis. A *Scoping Summary Report* (BOEM 2022b) 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

On December 23, 2022, BOEM issued a Notice of Availability (NOA) for the Draft EIS. The Draft EIS was made available in electronic format for public viewing at https://www.boem.gov/renewable-energy/state-activities/new-england-wind-formerly-vineyard-wind-south. Notification was provided as indicated in Appendix N, List of Agencies, Organizations, and Persons to Whom Copies of the Statement Are Sent, of the Draft EIS. Hard copies and digital copies of the Draft EIS were delivered to entities as requested. The NOA commenced the 60-day public review and comment period of the Draft EIS. BOEM held three virtual public hearings to solicit feedback and identify issues for consideration in preparing the Final EIS. Throughout the public review and comment period, government agencies, members of the public, and interested stakeholders had the opportunity to provide comments on the Draft EIS in various ways, including the following:

- 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.
- Through the regulations.gov web portal by navigating to https://www.regulations.gov/, searching for docket number "BOEM-2022-0070," and submitting a comment.
- By attending one of the public hearings on the dates listed in the NOA and providing written or verbal comments.

BOEM reviewed and considered all comment submissions in the development of the Final EIS. BOEM's evaluation of public submissions focused on those comments within the submissions that were identified as substantive. EIS Appendix O, Responses to Comments on the Draft Environmental Impact Statement, describes the public comment processing methodology and includes comment responses. All public comment submissions received on the Draft EIS can be viewed online at https://www.regulations.gov/ by typing "BOEM-2022-0070" in the search field.

A.2.3.3 Distribution of the Final Environmental Impact Statement

The Final 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 digital copies of the Final EIS can be requested by contacting the Program Manager, Office of Renewable Energy Programs in Sterling, Virginia. Publication of the Final EIS initiates a minimum 30-day mandatory waiting period, during which BOEM is required to pause before issuing a ROD. The ROD will state clearly whether BOEM intends to approve, approve with conditions, or disapprove the COP for construction, operations, and decommissioning of the proposed Project. Notification will be provided as indicated in Appendix N of the Final EIS.

A.3 References

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Appendix B
Supplemental Information and Additional Figures and Tables

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Abbreviations and Acronyms

°F	degree Fahrenheit
%	percent
$	dollar
§, §§	section, sections
µPa	micropascal
μPa^2s	micropascal squared second
AMSL	above mean sea level
ANSI	American National Standards Institute
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
CT	Connecticut
D	diameter; animal depth
dB	decibel
dB re 1 µPa	decibels referenced to 1 micropascal
dB re 1 µPa m	decibels referenced to 1 micropascal at 1 meter
dB re 1 $\mu Pa^2 m^2s$	decibels referenced to 1 micropascal squared meter squared second
DP	dynamic positioning
DPS	distinct population segment
DTH	down-the-hole
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
Fed. Reg.	Federal Register
FMP	Fisheries Management Plan
h/D	water depth divided by pile diameter
HDD	horizontal directional drilling
HFC	high-frequency cetacean
HRG	high-resolution geophysical survey
Hz	hertz
IPF	impact-producing factor
ISO	International Standards Organization
ITA	Incidental Take Authorization
IUCN	International Union for Conservation of Nature
JASMINE	JASCO Applied Sciences Animal Simulation Model Including Noise Exposure
kHz	kilohertz
kJ	kilojoule
km^2	square kilometer
LFC	low-frequency cetacean
LOA	Letter of Authorization
Lpk	peak sound pressure level in units of decibels referenced to 1 micropascal
Lpk-pk	peak-to-peak level
M	animal mass in kilograms
MA	Massachusetts

MBES	multibeam echosounders
MFC	sound exposure level over 24 hours
m/s	meters per second
m/s^2	meters per second squared
MW	megawatt
NA	not applicable
NARW	North Atlantic right whale
NCDC	National Climatic Data Center
NEFSC	Northeast Fisheries Science Center
NJ	New Jersey
NMFS	National Marine Fisheries Service
nm/s	nanometer per second
NOAA	National Oceanic and Atmospheric Administration
NY	New York
OCS	Outer Continental Shelf
OECC	offshore export cable corridor
Pa	pascal
PAM	passive acoustic monitoring
PBR	potential biological removal
PK	peak sound pressure level
PPW	pinnipeds in the water
Project	New England Wind Project
PTS	permanent threshold shift
re	referenced to
RI	Rhode Island
RI DEM	Rhode Island Department of Environmental Management
RI/MA Lease Areas	Rhode Island and Massachusetts Lease Areas
rms	root-mean-square
S	scour
SEL	sound exposure level
SEL_{24h}	sound exposure level over 24 hours
SEL_{SS}	sound exposure level single strike
S/h	scour depth divided by water depth
SPL	sound pressure level
SWDA	Southern Wind Development Area
TTS	temporary threshold shift
UME	unusual mortality event
U.S.	United States
USGS	U.S. Geological Survey
UXO	unexploded ordnance
VMS	vessel monitoring system
VTR	vessel trip report
WDA	Wind Development Area
WTG	wind turbine generator

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 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 is 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).

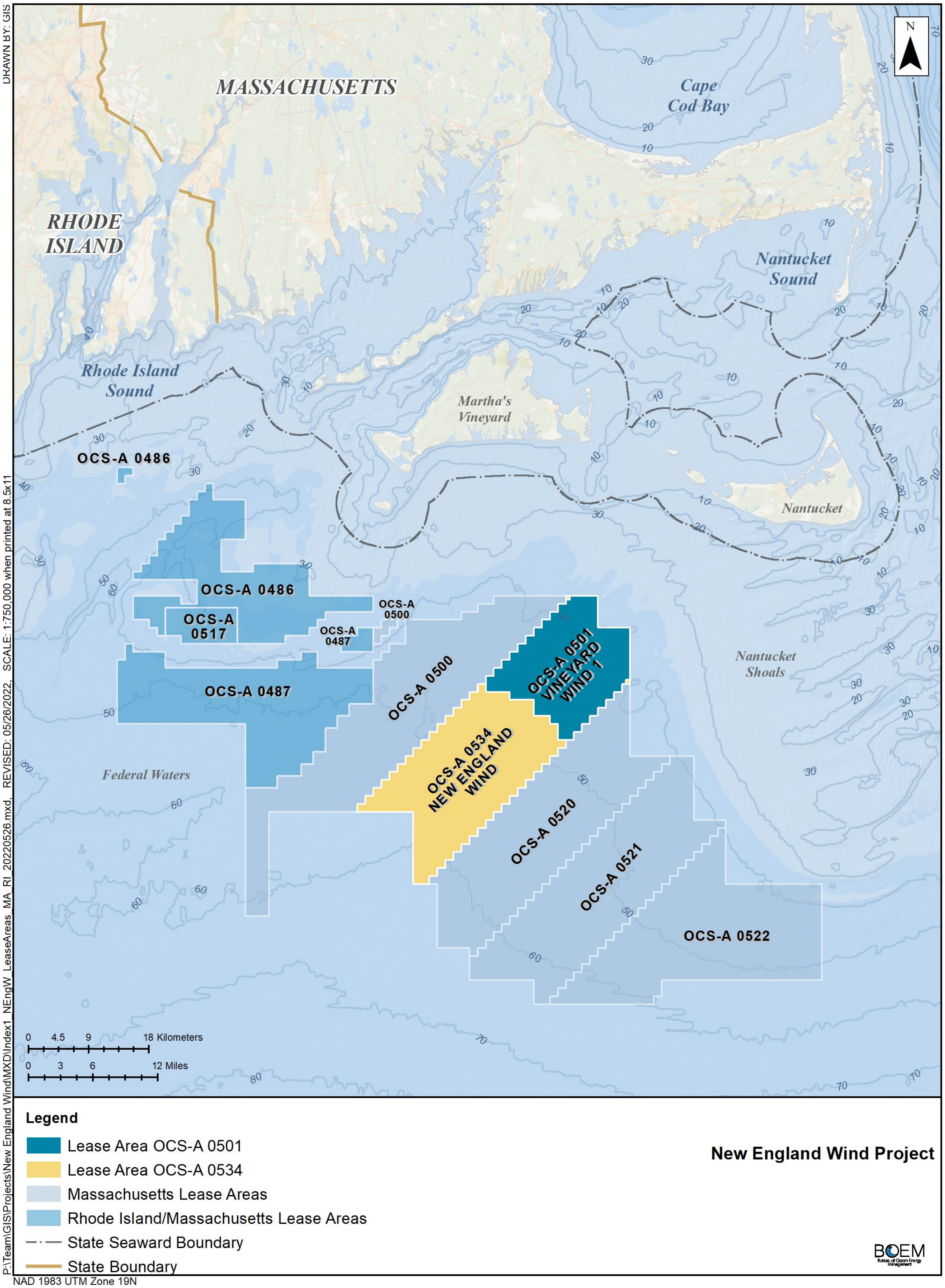


Figure B-1: Proposed Project Region

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 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: 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-2 summarizes wind conditions in the Massachusetts coastal division. Table B-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-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-2 shows a 5-year wind rose for Buoy Station 44020 (Nantucket Sound). Wind speeds are in meters per second (m/s). Percentages indicate how frequently the wind blows from that direction.

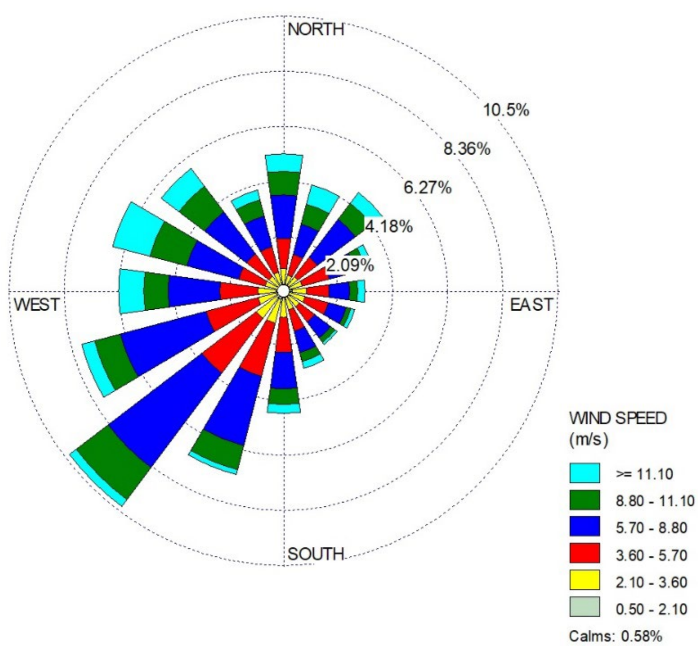


Figure B-2: 5-Year (2015–2019) Wind Rose for Buoy 44020

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-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-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-4 presents atmospheric mixing height data from two nearby stations. As shown Table B-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-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-5 and B-6 provide data and results related to geological resources in the SWDA and OECC, respectively.

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

Data/Results	Summary
Data	• > 12,328 miles of geophysical trackline data • 8 deep boreholes • 56 deep downhole CPTs • 210 seabed CPTs • 187 vibracores • 96 benthic grab samples with still photos • 36 underwater video transects
Surface conditions	• Water depths 141 to 203 feet, offshore slope of < 1 degree toward the south-to-southwest • Minimal seafloor topography, minimal relief • Generally homogenous surficial sediments, varying percentages of sand and silt • Irregular, northeast-to-southwest bathymetric lows up to 16.4 feet deep • 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 • Benthic habitats of uniform, unconsolidated sediment • Trawler drag marks on the seafloor indicate some fishing • Very few human-made objects (mostly fishing gear and debris); two possible shipwrecks identified in the SWDA
Subsurface conditions	• Consistent stratigraphy underlying the site • Materials range from clay to gravel, with isolated coarse material • Discontinuous coarse deposits associated with lag deposits with possible isolated boulders • Abundant channeling apparent throughout, few other structures • Ravinement surface 3.3 to 19.7 feet below the seafloor • 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 • Peat/organic material in paleochannels scattered throughout SWDA • Boulders possible in subsurface throughout the SWDA, patchy and scattered, approximately 33 to 302 feet below the seabed • Weakly cemented beds are possible throughout the SWDA at depths below 105 feet below the seabed • Two possible wreck sites identified in the western portion of the SWDA

Source: COP Volume II-A, Table 6.0-1; Epsilon 2023

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

Table B-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 • 2 deep bore holes • 3 deep downhole CPTs • 134 seabed CPTs • 192 vibracores • 163 benthic grab samples with still photos • 119 underwater video transects
Surface conditions	• Water depths < 3.6 to 150.9 feet; local slopes up to 25 to 30° on bedforms • Numerous natural slopes/topography, < 10-degree gradients • Overall homogenous surficial sediments, mainly sand • Mobile surface layer with sand waves > 6.6 feet high locally • Sand with some gravel, cobbles in shallow, higher current areas • Localized concentrations of boulders with gravel and sand in the northern portion of the OECC • Sand with silt in deeper water areas, less tidal current • 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 • Variable benthic habitats due to different substrates; some sensitive habitats possible locally • Rippled scour depressions offshore, bedform fields with isolated, larger sand waves over 16.4 feet in Nantucket Sound • Coarse deposits with boulders in Muskeget Channel area • Overall low concentration of manmade objects with moderate concentration locally • 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 • Fine-grained, organic-rich layers associated with channel bank/terrace deposits adjacent to some paleochannels • Often acoustically transparent mobile sand layer • Coarse deposits with boulders in Muskeget Channel area
Hazards	• Large sand waves in some areas • Paleochannels with top sections in the upper 6.6 feet; all sediments sampled by geotechnical investigations and pose no threat to cable installation • Localized subsurface gas in Centerville Harbor; no issue for cable installation • Coarse deposits with boulders in Muskeget Channel area • Possible sensitive habitats for avoidance, if possible, mainly Muskeget area • 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 2023

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 2023). 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 2023).

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 2023). 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 Environmental Impact Statement (EIS) 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. The mechanical properties of some sediments can have engineering implications for construction activities and need to be accounted for during planning and design stages. Specifically, glauconite sand in the subsurface has been identified as a potential geohazard due to its susceptibility to crushing, resulting in driving resistance and premature pile installation refusal, which are significant risks to offshore wind farm development (Westgate et al. 2022). The applicant is developing their understanding of glauconite within the SWDA and its potential impacts on proposed Project construction through independent data collection and analysis on geotechnical parameters, soil properties, and pile drivability, as well as through participation in an ongoing Joint Industry Partnership. A preliminary drivability report that was prepared for the Vineyard Wind 1 Project is provided in the COP (Volume II, Appendix II-AS; Epsilon 2023) to provide additional context. The analysis in the report was conducted prior to the collection of detailed, site-specific geotechnical data and does not specifically address glauconite soils. Additional drivability and design analyses have been completed and independently reviewed by National Renewable Energy Laboratory and would be used to support the selection of foundation types and construction techniques for the Project.

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 (MW) 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 2023). 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.

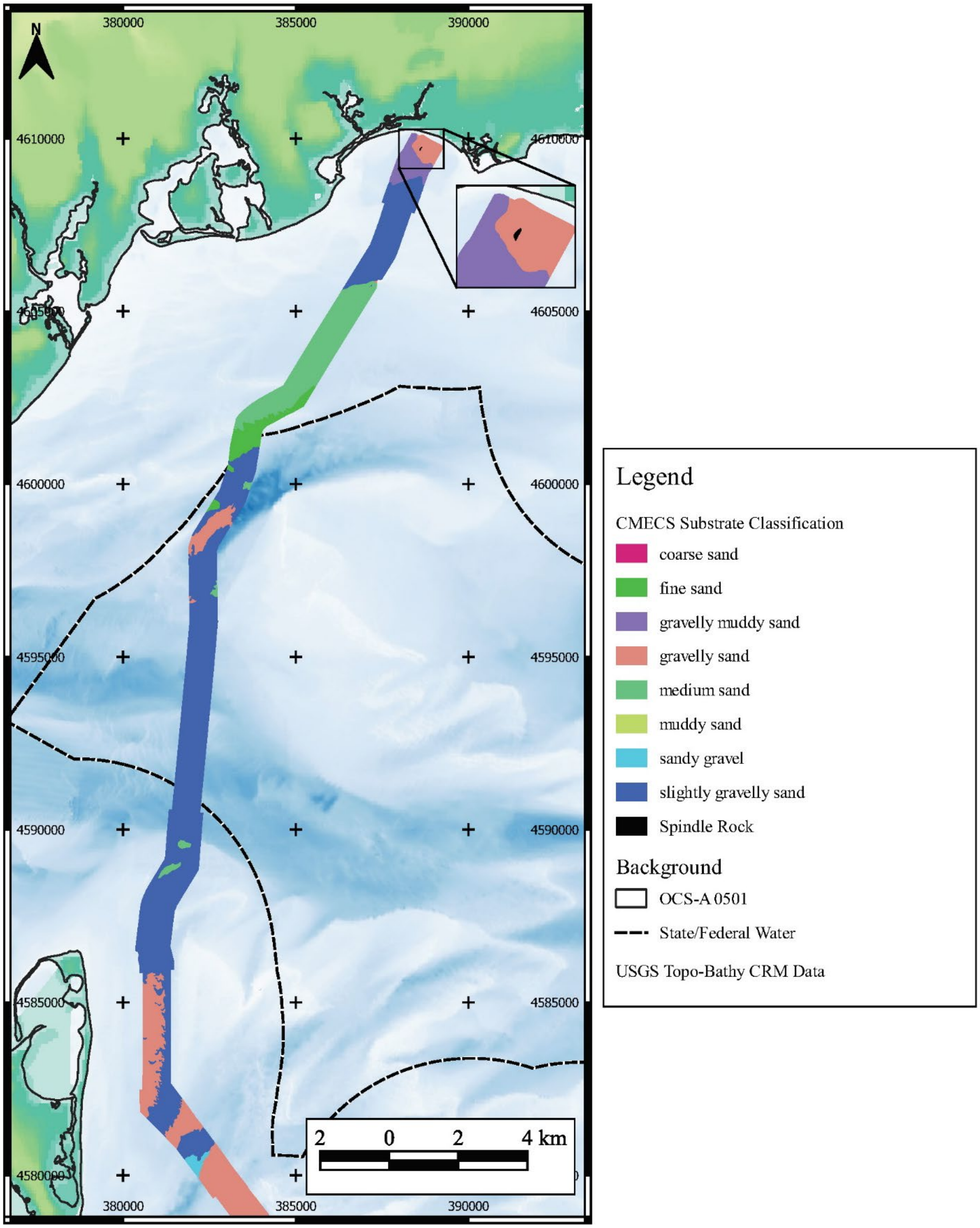
Seafloor conditions can also be described according to the Coastal and Marine Ecological Classification Standard substrate component, which classifies seafloor types based on the composition and particle size of the surface layers of the substrate (FGDC 2012). Maps delineating seafloor conditions according 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-3 and B-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.

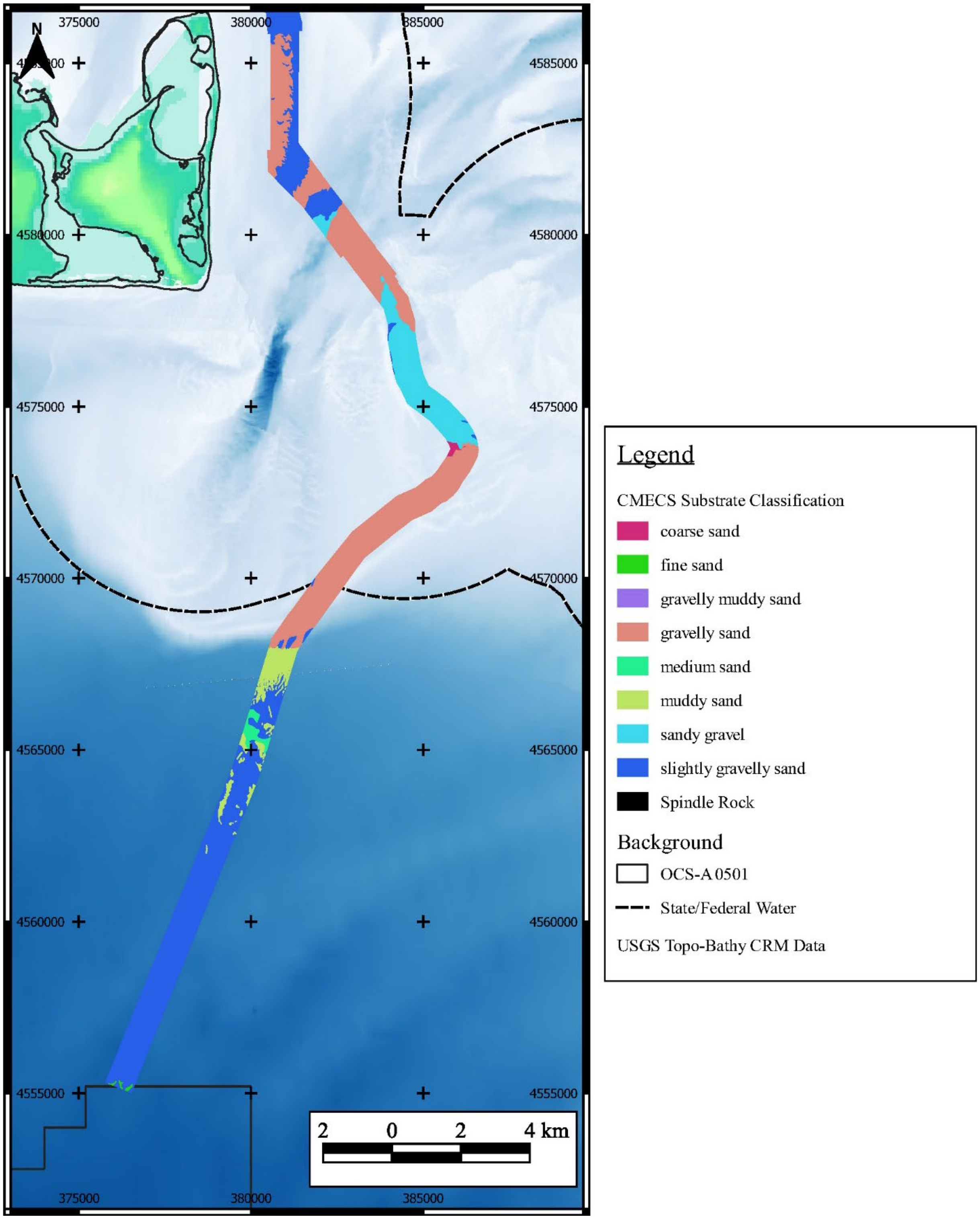
BOEM Atlantic lease areas are described as sediment-starved due to continental geology and the distance from shore, meaning there are no additional sediment inputs to the OCS. Thus, surficial sediments are continually reworked by oceanographic forces such as tides, currents, and storms, and sedimentation 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 2023). 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 2023). Sediment transport and mobility is low within the proposed SWDA given the slow tidal current velocity (COP Appendix III-Q, Section 2.1; Epsilon 2023). 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-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-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).

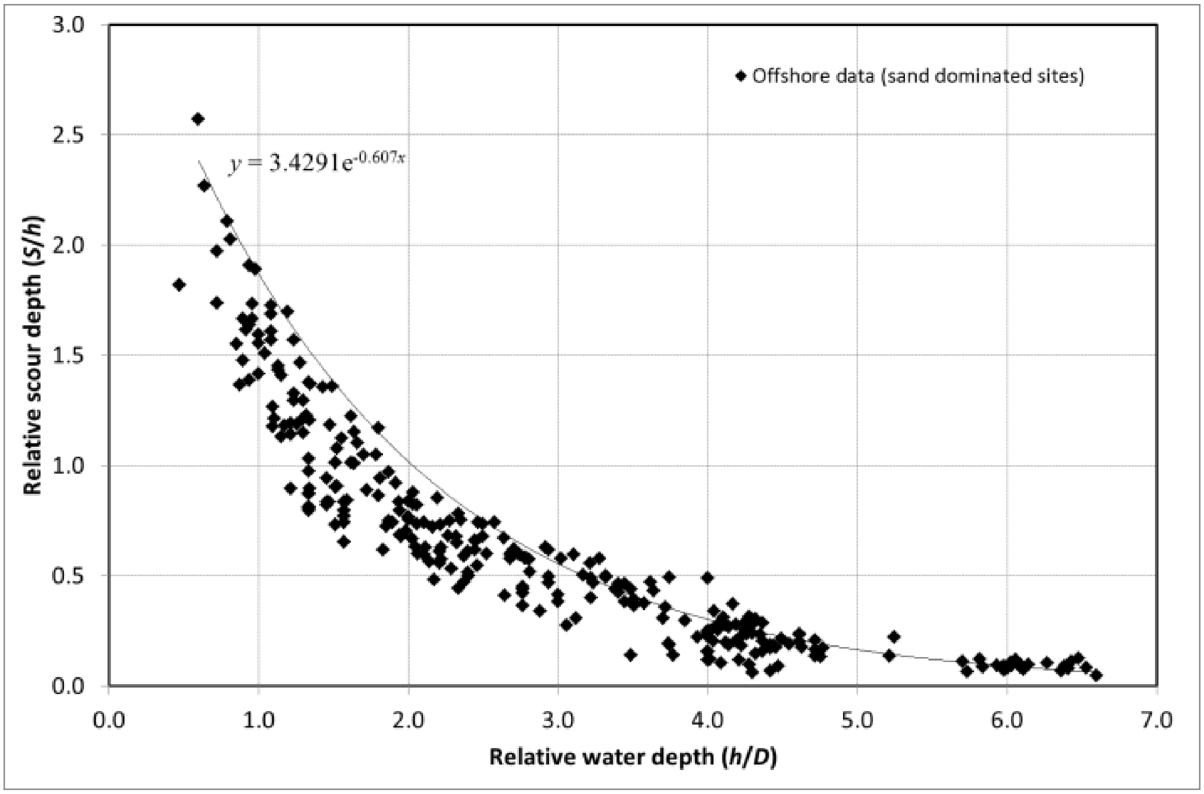
Site conditions and foundation diameter tend to dominate scour potential analysis. Sand-dominated seabeds are more susceptible to severe scour than finer grained or mixed sediments; as the foundation diameters increase, the potential depth (severity) of scour also increases. Based on field measurements 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-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-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 2023). 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 2023).

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 EIS Sections 3.6 through 3.9 and G.2.3 through G.2.5.

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, which include the proposed Project area, for feeding, breeding, socializing, and migration (Stone et al. 2017; Leiter et al. 2017). At least 16 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). Operational activities would overlap with species occurrence in the proposed Project area. The time of year; the type and level of marine mammal activity in the area; and duration of construction, operations, and decommissioning activities of the proposed Project were important factors in determining which marine mammal species would likely be present at the time and place of the various activities associated with offshore wind development on the Atlantic OCS. Furthermore, species occurrence and density data were used to identify the subset of marine mammals for consideration and estimate the distributions of those species. Among marine mammal species that have a reasonable probability of occurrence, in this area, five are listed as endangered: North Atlantic right whale (NARW; *Eubalaena glacialis*), blue whale (*Balaenoptera* *musculus*), fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), and sperm whale (*Physeter macrocephalus*). However, as discussed in EIS Section 3.7, blue whales are rare in the proposed Project area. The low expected occurrence of blue whales in the proposed Project area, combined with the proposed mitigation (EIS Appendix H, Mitigation and Monitoring), results in a very low potential for impacts on blue whales from the proposed Project. Therefore, no impacts on blue whales are expected from proposed Project activities, and this species was not considered further in the EIS. The COP (Volume III, Section 6.7; Epsilon 2023), BOEM (2014), and EIS Section 3.7 present a list of all marine mammals that may occur in the area along with their relative occurrence in the proposed Project area. Corresponding detailed descriptions are included in the COP and Section B.5, Marine Mammals and Underwater Sound.

Marine mammals are highly migratory, and seasonal occurrences near the proposed Project vary for each species. The National Marine Fisheries Service (NMFS) biological assessment (BA) includes distribution maps of the listed species near the proposed Project and details regarding their seasonal occurrence (BOEM 2023a). The applicant also submitted comprehensive acoustic modeling of underwater sound propagation and potential auditory impacts on marine species during noise-producing construction activities for the proposed Project (COP Appendix III-M; Epsilon 2023) that provided detailed information for the pile-driving analysis, unexploded ordnance (UXO) removal analysis, and high-resolution geophysical (HRG) survey analysis. These results are also summarized in Section B.4, Background on Underwater Sound.

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 2023b). A complete list of species with EFH near the proposed Project can be found in BOEM 2023b. Table B-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 2023b.

Table B-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 2019a)
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 2023b)
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 2023a)
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 2019a)
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 2023a)
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 2023a)
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.

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 2023).

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 2023). 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 2023). As mentioned in Table B-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 within or near the proposed Project area: leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), and green (*Chelonia mydas*). Each of these species is protected under the Endangered Species Act (ESA; EIS Section 3.8, Sea Turtles). Hawksbill sea turtles (*Eretmochelys imbricata*) also occur in the U.S. northwest Atlantic Ocean but typically prefer tropical habitats; sightings are rare north of Florida, though there are few historical records as far north as Massachusetts, most recently as 1999 (NMFS and USFWS 1993; MGEL 2022).

The four sea turtle species that are likely to occur in the proposed Project area are migratory and occur in New England waters primarily in the summer and fall (Kraus et al. 2016a; O'Brien et al. 2021a, 2021b). Some individuals may remain in the region into the winter, but occurrence is less likely when water temperatures are low (i.e., winter and spring) (BOEM 2012; Greene et al. 2010). Sea turtle stranding and sighting data show similar seasonal trends among loggerhead, leatherback, Kemp's ridley, and unidentified sea turtles in the proposed Project area (WBWS 2022, NMFS 2022a). Additional information on sea turtle occurrence in the proposed Project area is available in the proposed Project NMFS BA (BOEM 2023a).

Sea turtles would use the proposed Project area mainly for travel and foraging but may spend extended rest periods on the seafloor or at the sea surface (COP Volume III, Section 6.8; Epsilon 2023; BOEM 2023a). Targeted surveys have been conducted for sea turtles near the proposed Project area, and the results can be found in the *Atlantic Marine Assessment Program for Protected Species* surveys (Palka et al. 2017, 2021), *Northeast Large Pelagic Survey Collaborative Aerial and Acoustic Surveys for Large Whales and Sea Turtles* (Kraus et al. 2016a), *Megafauna aerial surveys in the wind energy areas of Massachusetts and Rhode Island with emphasis on large whales: Summary Report Campaign 5, 2018-2019* (O'Brien et al. 2021a), *and Megafauna aerial surveys in the wind energy areas of Massachusetts and Rhode Island with emphasis on large whales: Interim Report Campaign 6A, 2020* (O'Brien et al. 2021b). A more detailed discussion regarding aspects of sea turtles potentially affected is available in the proposed Project NMFS BA (BOEM 2023a).

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).

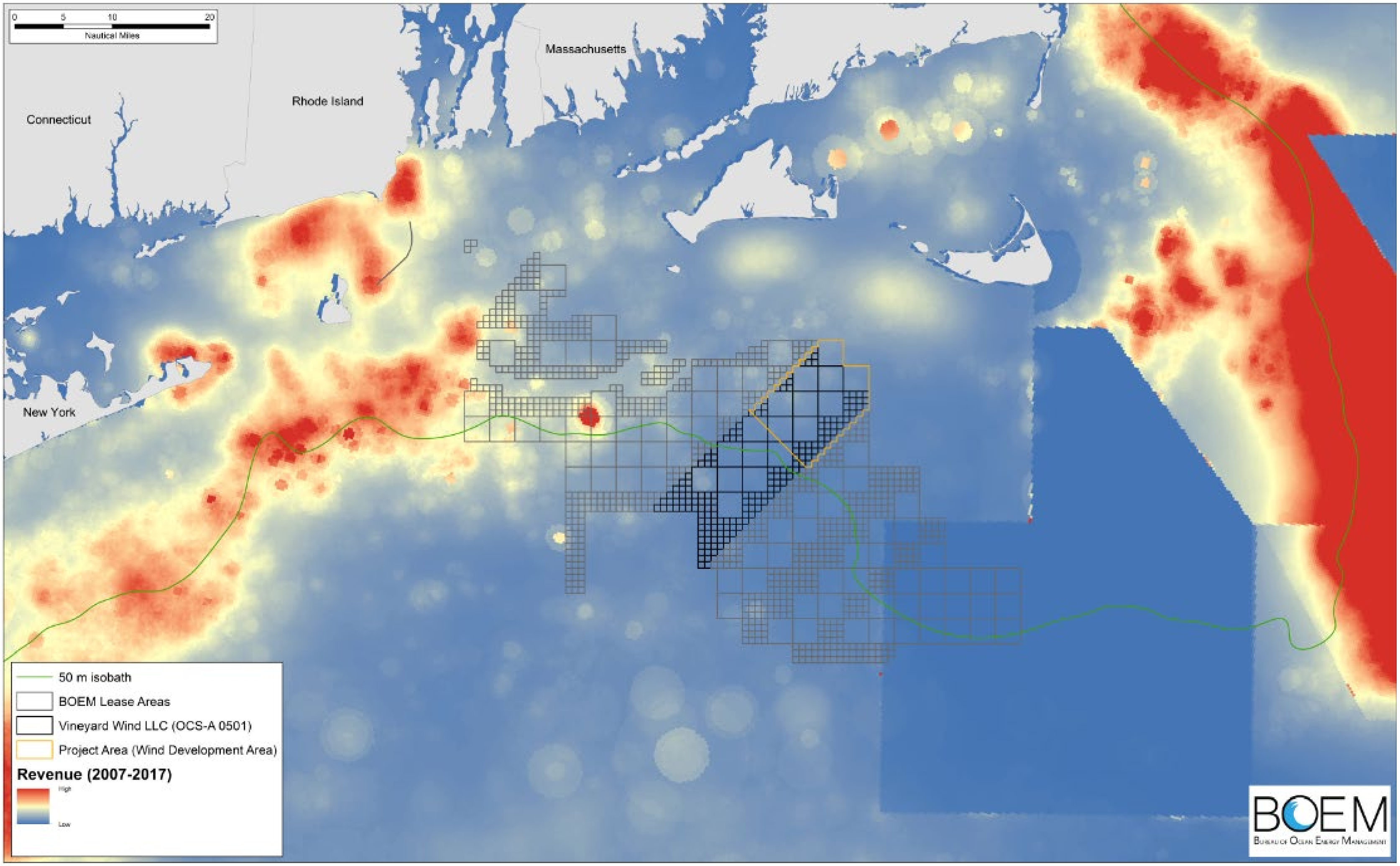
BOEM is working with state and federal partners to develop a regional monitoring strategy that focuses on biological resource impacts and builds off the lessons from Atlantic OCS and European wind development activities. Wind developers will also have site-specific monitoring requirements related to 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, Commercial Fisheries and For-Hire Recreational Fishing.

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-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. NMFS excluded mobile gear fishing in parts of Georges Bank for fish stock rebuilding. Moderate revenue fishing areas (yellow on Figure B-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-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-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-8). Point Judith, Rhode Island, landed 47.5 million pounds in 2017, valued at $64.8 million. Table B-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-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-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-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-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-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] Vessel Monitoring System was not required until 2014 for squid vessels.

Table B-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.

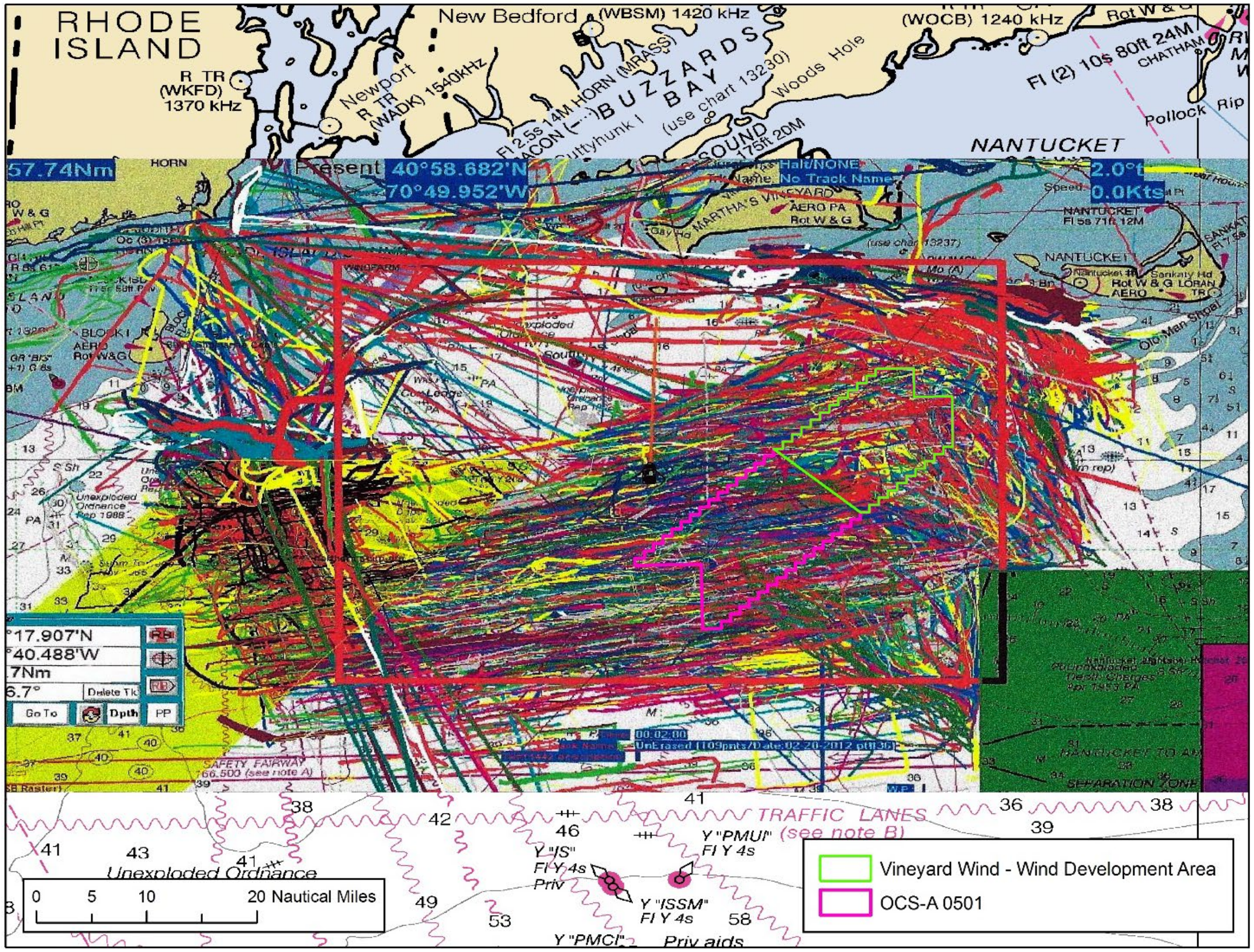
Table B-10: Value of Port Landings Harvested from the Vineyard Wind 1 Lease Area (Vessel Monitoring System Data, 2019 Dollars), 2011–2016

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-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-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-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-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-9 and Table B-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 2023).

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-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-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.

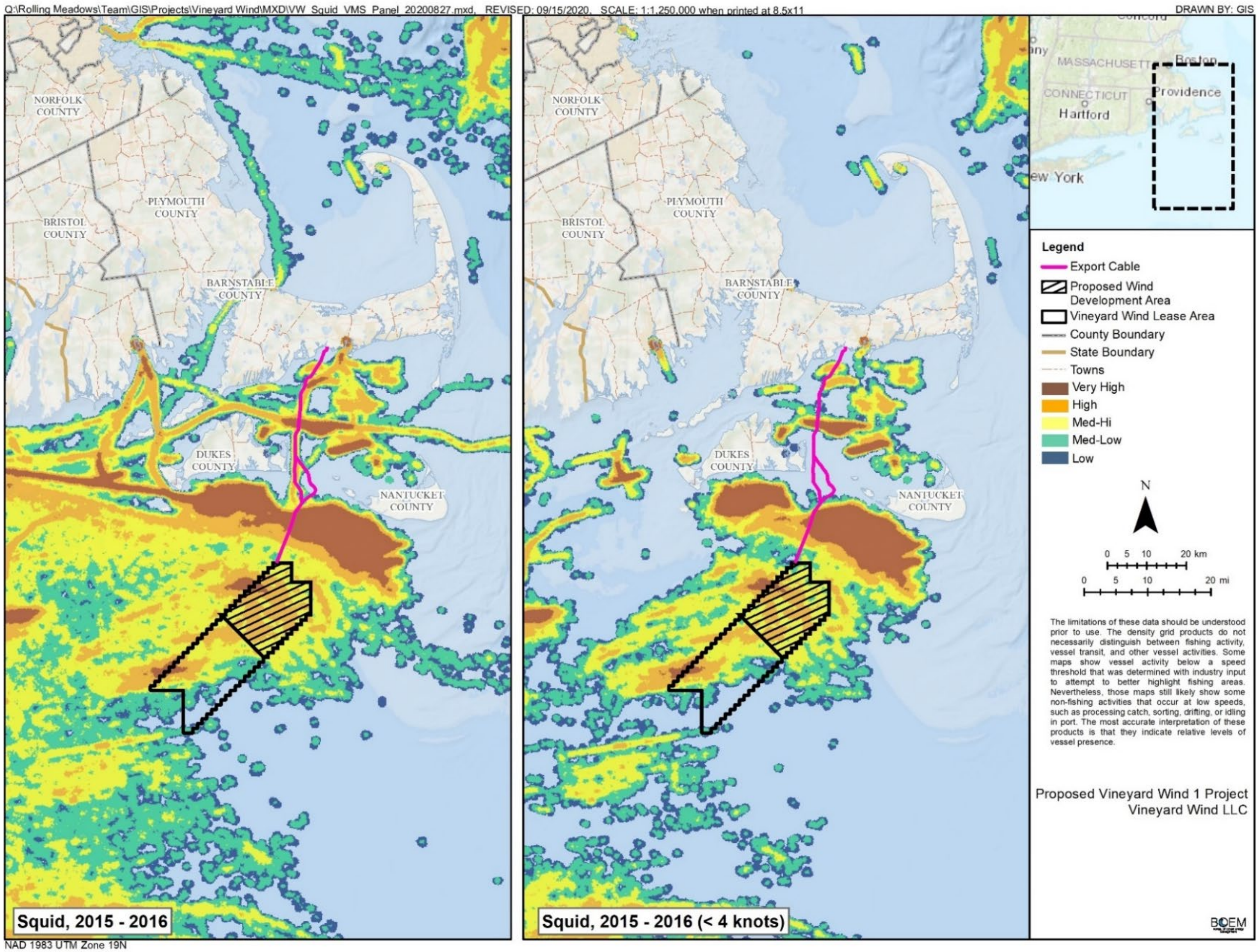
NOAA NEFSC also identified that more than $280,000[2] of lobster pot gear revenue comes from within the Massachusetts Wind Energy Area, which is primarily landed in Massachusetts (Kirkpatrick et al. 2017). After scallops, the state's second most valuable fishery is lobster, which has annual average landings 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-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-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.

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

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-11 and Table B-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-11 through Table B-20).



Source: Northeast Regional Ocean Council 2020

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

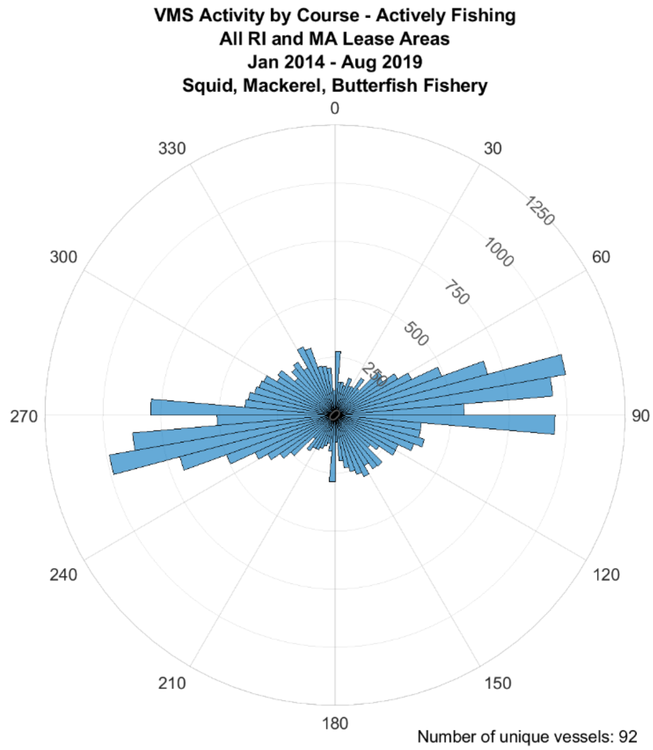


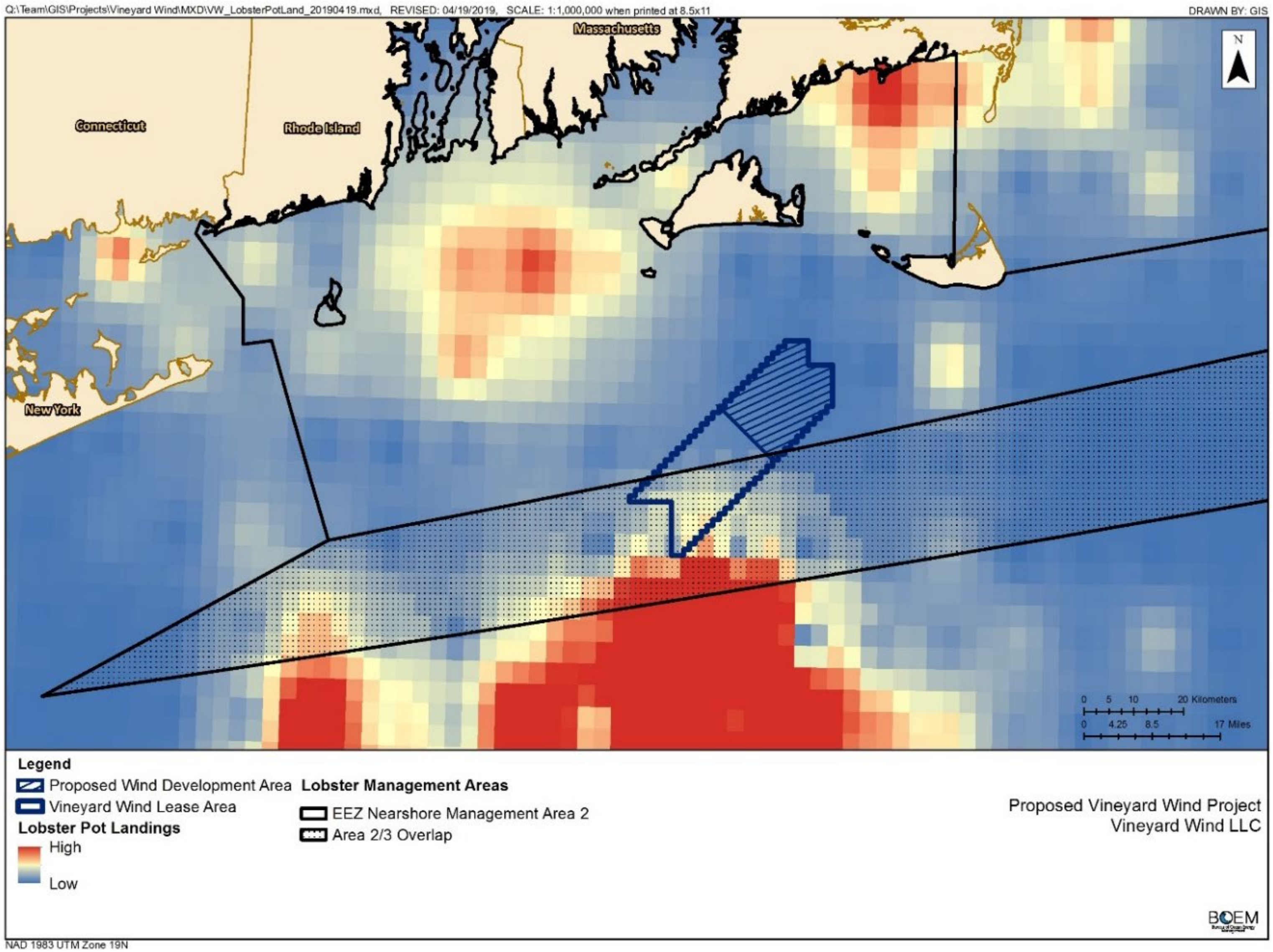
Figure B-9: Squid, Mackerel, Butterfish Fishery in Rhode Island/Massachusetts Lease Areas—Fishing

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

Although Table B-11, Table B-12, and Table B-13 through Table B-20 are based on the same underlying VTR data, Table B-11 and Table B-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.

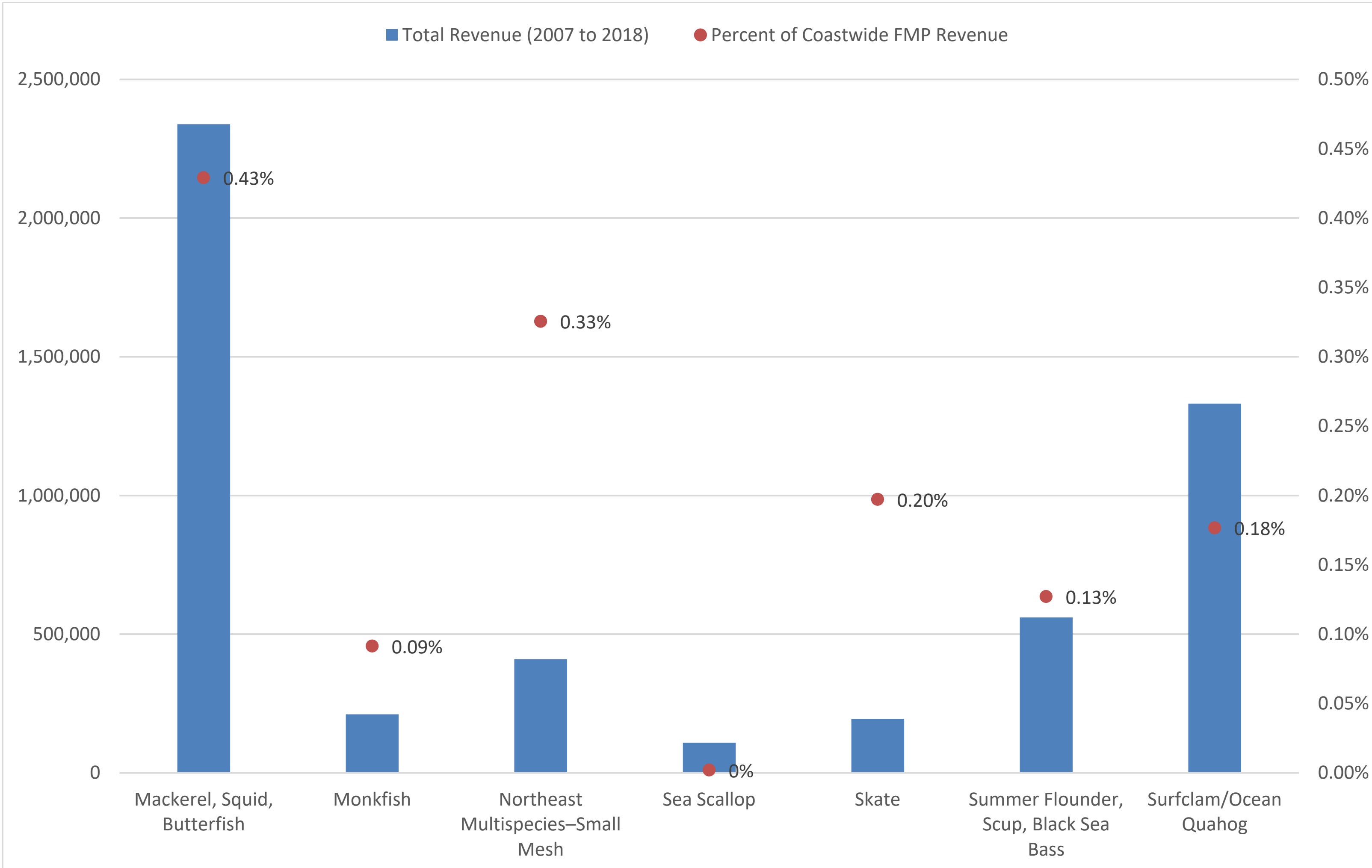
The commercial fisheries active in the proposed Project SWDA encompass a wide range of FMP fisheries, gears, and landing ports. Table B-21 through Table B-24 summarize the RI/MA Lease Areas (OCS-A 0534) commercial fish landings and associated revenue by FMP fishery, individual species, gear type, and total state revenue and landings based on the NMFS-prepared planning level assessment, which describes selected fishery landings and estimates of commercial revenue from each Atlantic Wind Energy Area (NMFS 2023a). Many of the following tables provide data between 2008 and 2021; however, the data from 2020 may not be indicative of historic or future operations. Both harvesters and other businesses reliant on fishing were affected by changes in fishing patterns due to COVID-19 and the associated responses and restrictions in some cases. An overwhelming majority of commercial fishing and for-hire recreational vessel operators and seafood processing and distribution sectors experienced significant impacts on operations during the 2020 operating year, with half the vessel operators indicating they stopped fishing for more than 3 months and nearly 90 percent of the operators reporting revenue losses (Glazier et al. 2022). In the interest of being comprehensive and providing the most recent and relevant data for analysis, the 2020 data are included; however, the entirety of the 14-year period being is used in assessing potential impacts.

Table B-21 and Table B-22 provide data on revenue and landings for 2008 through 2021 for commercial fisheries. Table B-23 provides the revenue (average annual and total) and landings in pounds (average annual and total) in the RI/MA Lease Areas by gear type for the 2008 to 2021 period. When looking at average annual landings and revenue generated by state, Table B-24 shows that ports in Massachusetts and Rhode Island generated the highest landings and revenue.



EEZ = Exclusive Economic Zone

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

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Table B-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-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-11 shows the value of landings for the WDA by the FMP; Table B-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-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-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-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-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-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-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-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-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.

Table B-21: Commercial Fishing Landings and Revenue of the Most Impacted Species from 2008 to 2021 for the Southern Wind Development Area

Species	14-Year Landings (2008 to 2021; pounds)	14-Year Revenue (2021 U.S. Dollars)	Average Annual Revenue (2021 U.S. Dollars)
Longfin squid *(Doryteuthis pealeii)*	1,297,000	$1,786,000	$127,571.4
Skates	1,168,000	$545,000	$38,928.6
Silver hake *(Merluccius bilinearis)*	1,004,000	$735,000	$52,500.0
All other	906,000	$743,000	$53,071.4
Jonah crab *(Cancer borealis)*	625,000	$576,000	$41,142.9
Scup *(Stenotomus chrysops)*	588,000	$447,000	$31,928.6
Monkfish *(Lophius americanus)*	415,000	$700,000	$50,000.0
Summer flounder *(Paralichthys dentatus)*	142,000	$462,000	$33,000.0
American lobster *(Homarus americanus)*	90,000	$466,000	$33,285.7
Atlantic sea scallop *(Placopecten magellanicus)*	34,000	$374,000	$26,714.3

Source: Developed using data from NMFS 2023a

Table B-22: Commercial Fishing Landings and Revenue of the Most Impacted Fisheries Management Plans from 2008 to 2021 for the Southern Wind Development Area

FMP	14-Year Landings (2008 to 2021; pounds)	14-Year Revenue (2021 U.S. Dollars)	Average Annual Revenue (2021 U.S. Dollars)
Mackerel, Squid, and Butterfish	1,460,000	$1,879,000	$134,214
Small-mesh multispecies	1,130,000	$781,000	$55,786
Summer flounder, scup, black sea bass	741,000	$950,000	$67,857
Atlantic States Marine Fisheries Commission	718,000	$1,045,000	$74,643
Monkfish	415,000	$700,000	$50,000
Skates	1,168,000	$546,000	$39,000
All others[a]	837,000	$679,000	$48,500
Atlantic Herring	562,000	$73,000	$5,214
Northeast Multispecies	102,000	$207,000	$14,786
No Federal FMP	79,000	$68,000	$4,857
Spiny Dogfish	56,000	$13,000	$929
Surflclam, Ocean Quahog	42,000	$34,000	$2,429
Sea Scallop	34,000	$374,000	$26,714
Tilefish	21,000	$86,000	$6,143
Bluefish	18,000	$15,000	$1,071
Highly Migratory Species	8,000	$7,000	$500
SERO FMP[b]	<500	<$500	$36

Source: Developed using data from NMFS 2023a
FMP = Fisheries Management Plan; NOAA = National Oceanic and Atmospheric Administration
[a] All others refers to FMP fisheries with fewer than three permits or dealers affected to protect data confidentially.
[b] SERO FMP is NOAA's Southeast Regional Office Fishery Management Plan.

Table B-23: Commercial Fishing Landings by Gear Type and Revenue of the Most Impacted Species from 2008 to 2021 for the Southern Wind Development Area

Gear Type	14-Year Landings (2008 to 2021; pounds)	14-Year Revenue (2021 U.S. Dollars)	Average Annual Revenue (2021 U.S. Dollars)
Bottom trawl	4,022,000	$4,026,000	$287,571.43
Gillnet-sink	1,151,000	$1,109,000	$79,214.29
Lobster pot	757,000	$1,068,000	$76,285.71
Clam dredge	586,000	$471,000	$33,642.86
Midwater trawl	465,000	$48,000	$3,428.57
All others	341,000	$325,000	$23,214.29
Scallop dredge	32,000	$342,000	$24,428.57
Other pot	27,000	$32,000	$2,285.71
Bottom longline	9,000	$35,000	$2,500.00
Handline	<500	<$500	$35.71

Source: Developed using data from NMFS 2023a

Table B-24: Commercial Fishing Landings and Revenue by State from 2008 to 2021 for the Southern Wind Development Area

State	14-Year Landings (2008 to 2021; pounds)	14-Year Revenue (2021 U.S. Dollars)
Massachusetts	3,456,000	$3,286,000
Rhode Island	3,218,000	$3,139,000
New York	355,000	$476,000
Connecticut	227,000	$239,000
Virginia	54,000	$120,000
North Carolina	40,000	$112,000
New Jersey	28,000	$64,000
Maryland	2,000	$5,000
All others	1,000	$1,000
Maine	1,000	$1,000
Total	**7,382,000**	**$7,443,000**

Source: Developed using data from NMFS 2023a

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-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-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-13 and Table B-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-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-11). For 2007 to 2018, the total revenue for this FMP was $2.3 million (Table B-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-9]) but with higher activity densities also seen north of the WDA.

To the contrary, Table B-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).

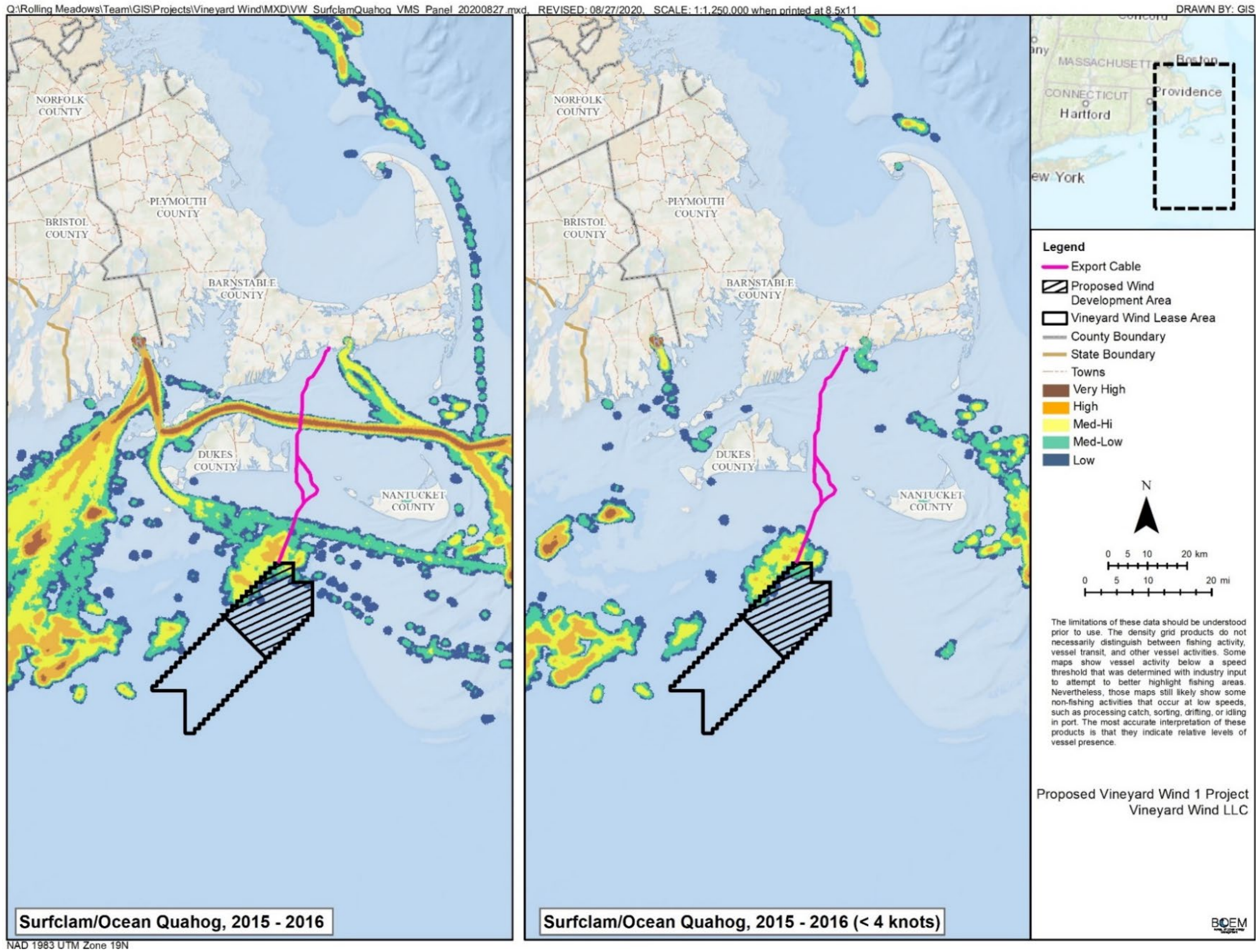
As shown on Figure B-12, VMS data indicate that surf clam/ocean quahog fishing vessels are not typically found within the WDA; however, along the OECC, there were areas where very high density of catch were indicated. Figure B-12 shows the relative surf clam/ocean quahog fishing vessel density during 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-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-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-14). Figure B-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-15 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-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-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-13 and Table B-14).

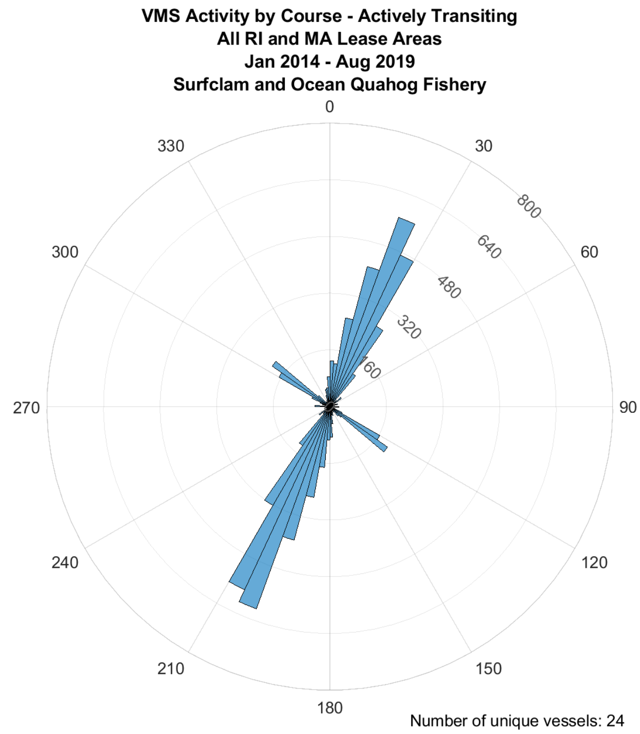
Table B-15 and Table B-16 show the value and volume of landings for the WDA from 2008 to 2017. Bottom trawl is the primary gear type used in the WDA, where an estimated 57 percent of all revenue from the WDA and more than 65 percent of landed fish was caught using bottom trawl. Bottom trawl targets bluefish *(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-17 and Table B-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-19).



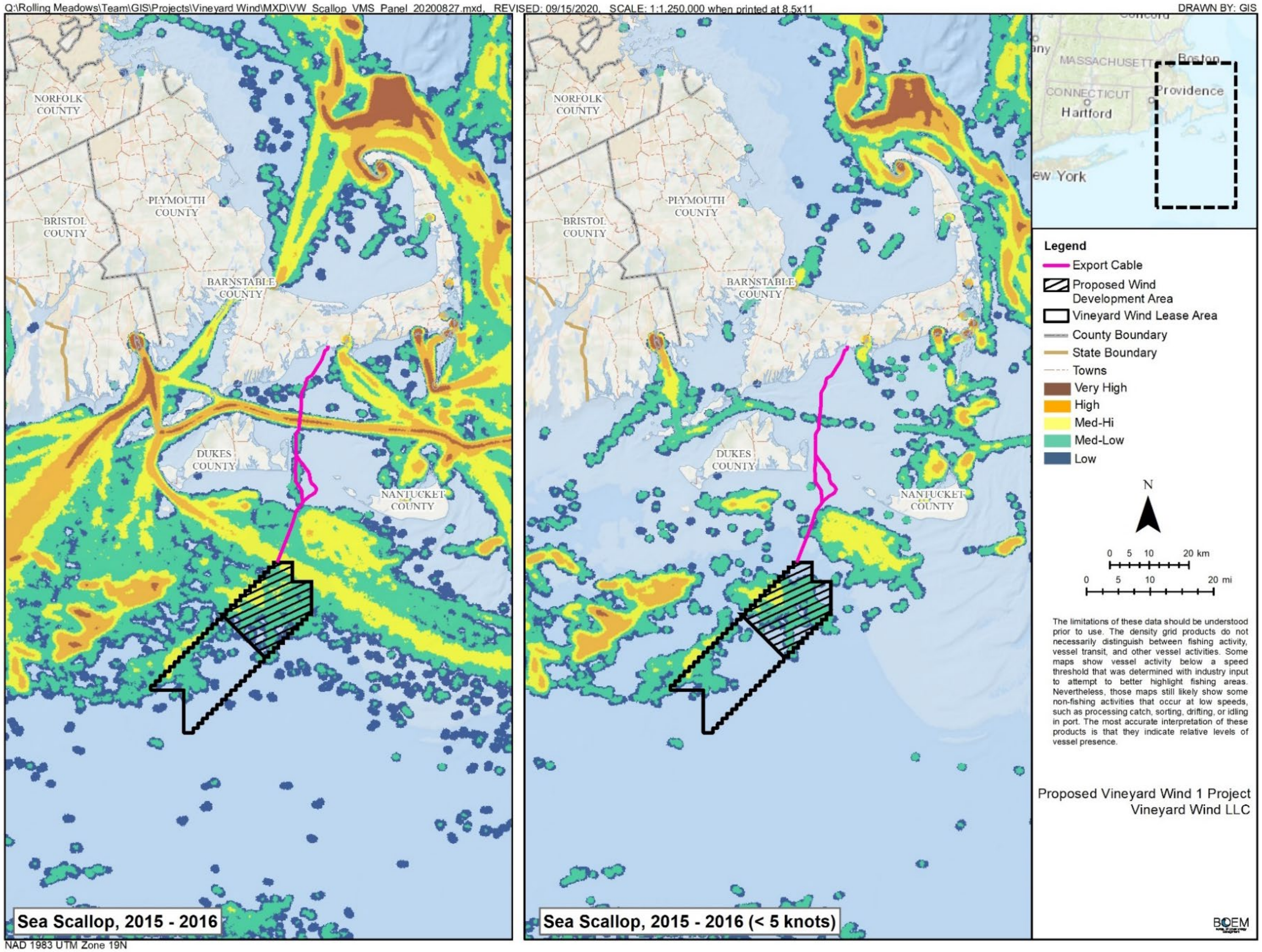
Source: Northeast Regional Ocean Council 2020

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



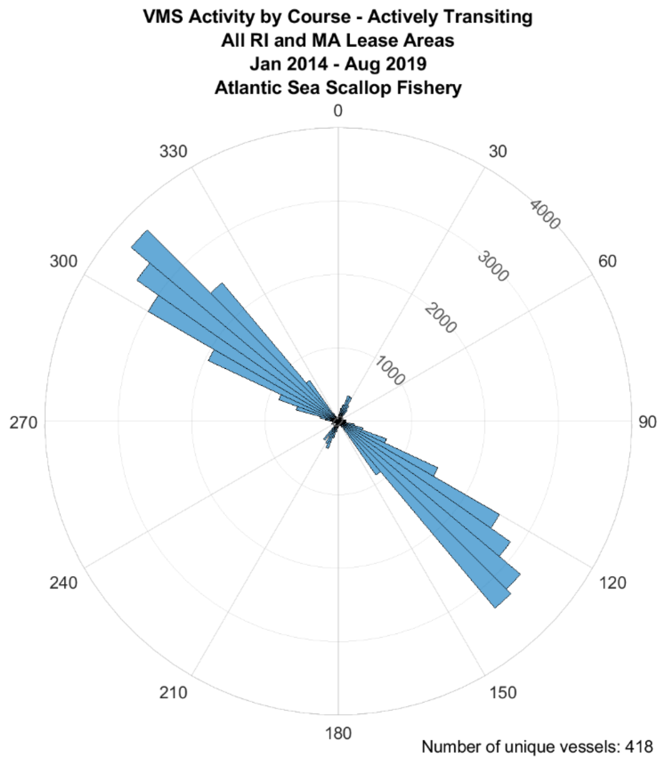
MA = Massachusetts; RI= Rhode Island; VMS = vessel monitoring system

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



Source: Northeast Regional Ocean Council 2020

Figure B-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-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-8, B-12, and B-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-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-17 and B-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.

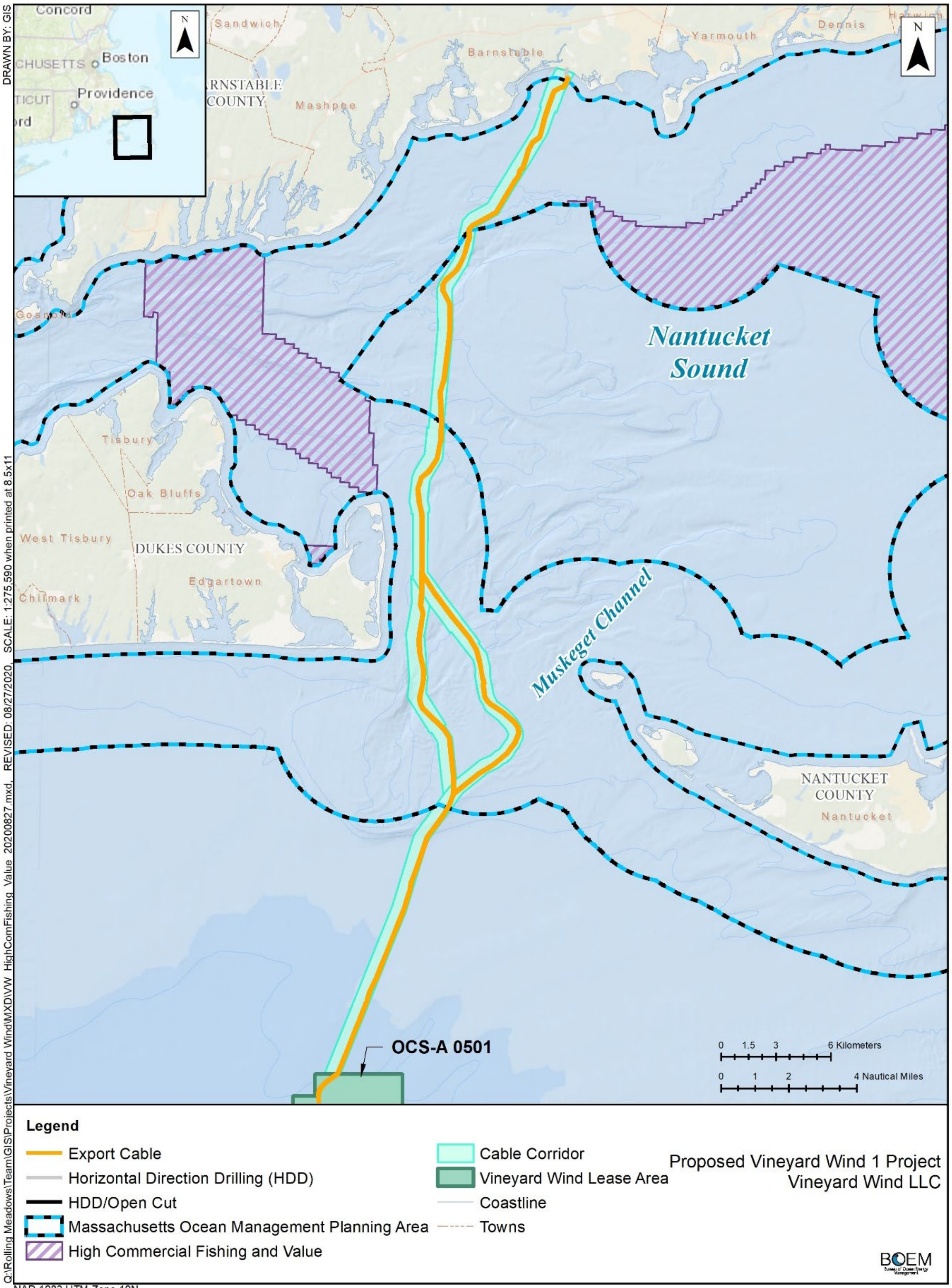
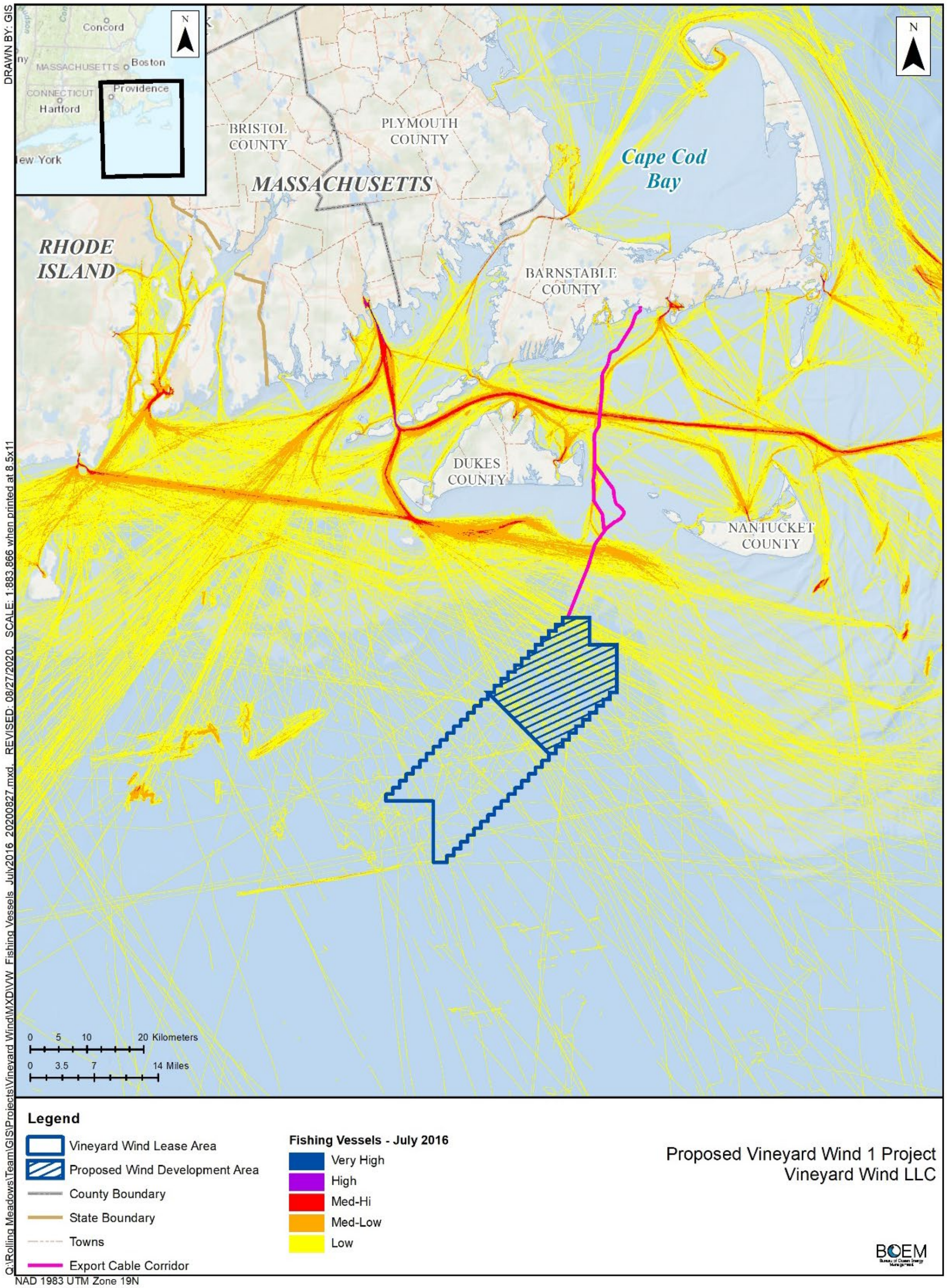
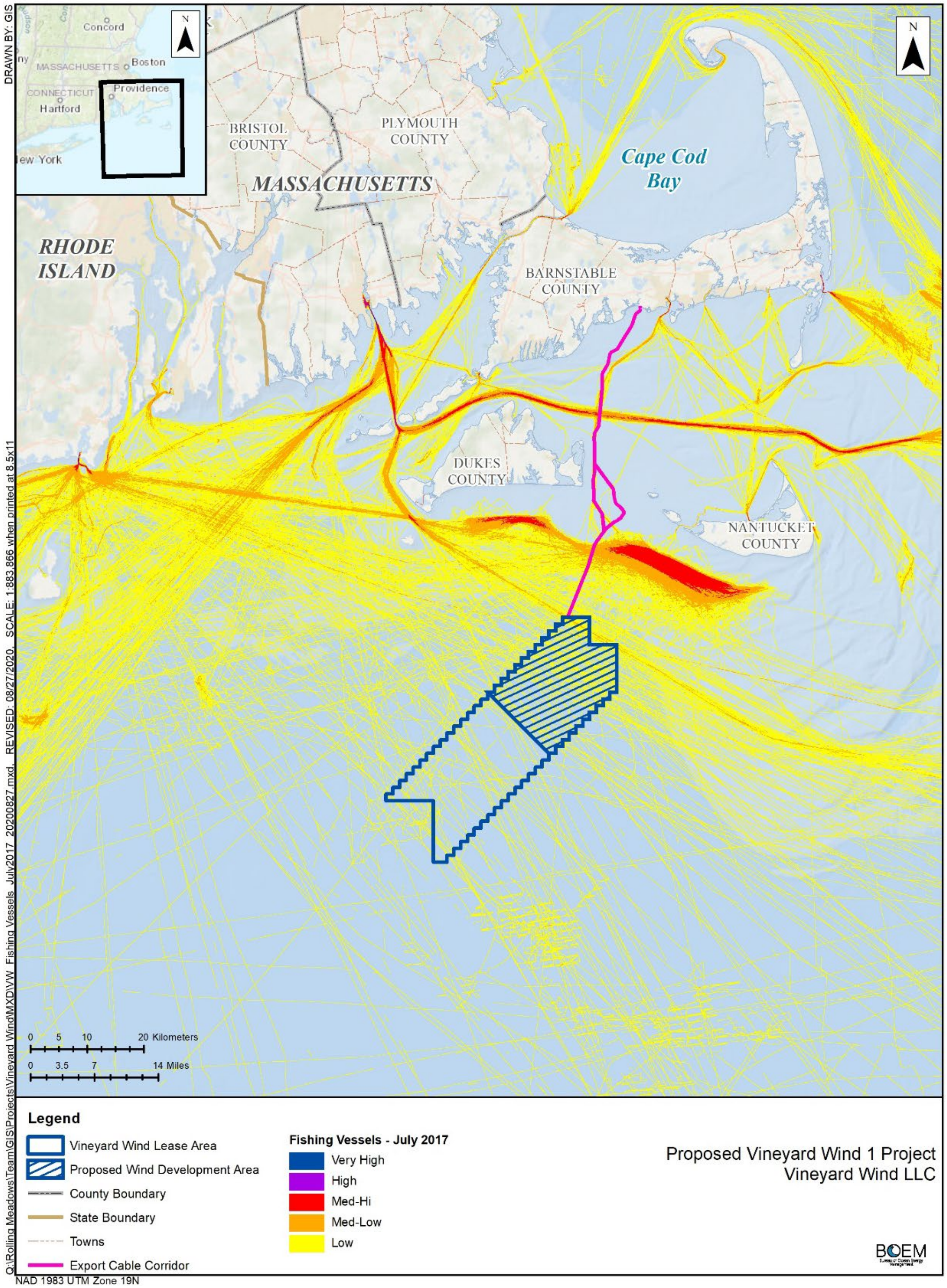


Figure B-16: Massachusetts Ocean Management Plan Areas of High Commercial Fishing Effort and Value



Source: Northeast Regional Ocean Council 2020

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



Source: Northeast Regional Ocean Council 2020

Figure B-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).

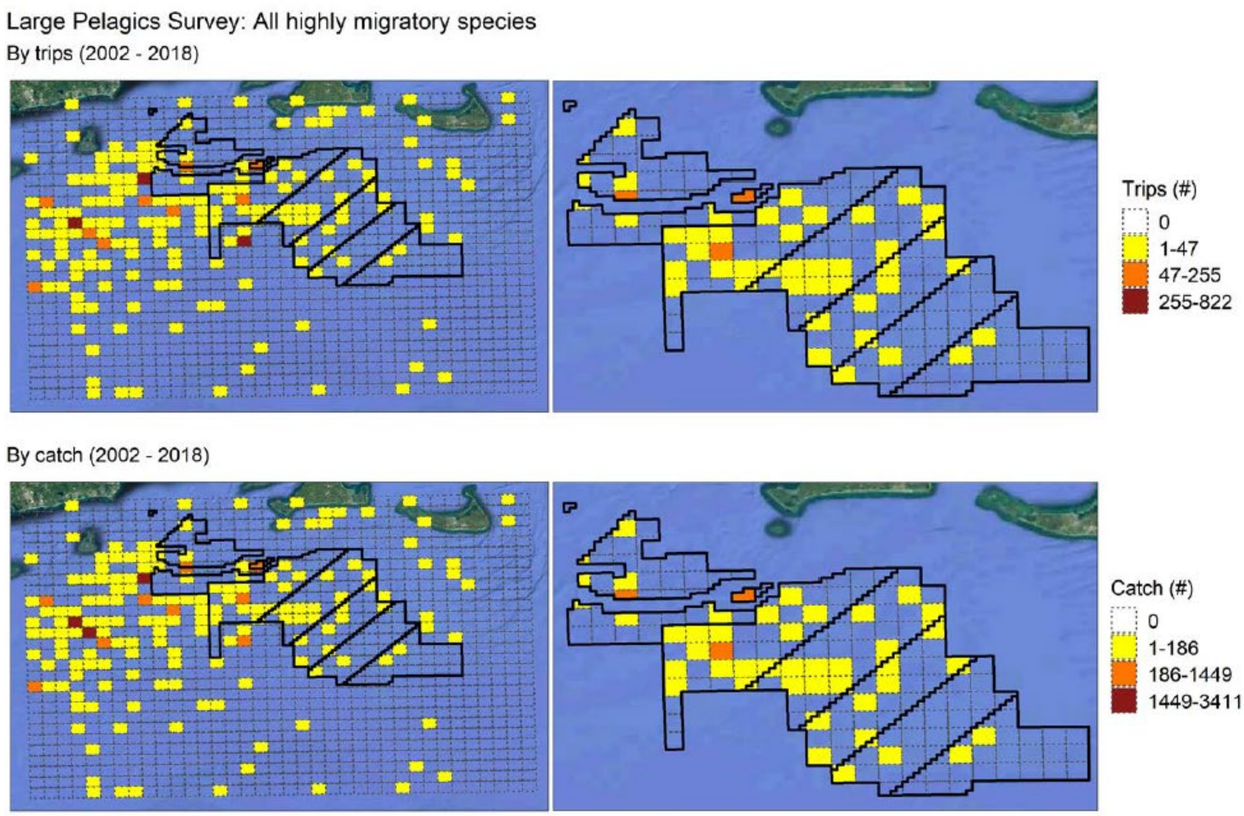
For-hire recreational fishing in the Atlantic provides opportunities for recreational fishing of highly migratory species such as tuna, billfish, swordfish (*Xiphias gladius*), and sharks. Tuna and sharks are found in the WDA where they feed on squid, mackerel, and butterfish found in the area. Tuna 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 3.9-3 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-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-25 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-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-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-25: 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 safe distance 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 (PAM), 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, Finfish, Invertebrates, and Essential Fish Habitat, and 3.10, Cultural Resources), 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 Background on Underwater Sound

B.4.1 Sources of Underwater Sound

Ocean sounds originate from a variety of sources. Some come from non-biological sources such as wind and waves, while others come from the movements or vocalizations of marine life (Hildebrand 2009). In addition, humans introduce sound into the marine environment through activities like oil and gas exploration, construction, military sonars, and vessel traffic (Hildebrand 2009). The acoustic environment or "soundscape" of a given ecosystem comprises all such sounds—biological, geophysical, and anthropogenic (Pijanowski et al. 2011). Soundscapes are highly variable across space, time, and water depth, among other factors, due to the properties of sound transmission and the types of sound sources present in each area. A soundscape is sometimes called the "acoustic habitat," as it can be a vital attribute of a given area where an animal may live (i.e., habitat) (Hatch et al. 2016).

B.4.2 Physics of Underwater Sound

Sounds are created by the vibration of an object within its medium (Figure B-20). When the object's vibration is coupled to the medium (e.g., water, in the case of underwater sound), that vibration travels as a propagating wave away from the sound source (Figure B-20). As this wave moves through the water, the water particles undergo tiny back-and-forth movements (i.e., particle motion), essentially oscillating in roughly the same location. When the particle motion results in more particles in one location (depicted as the area of compression on Figure B-20), that location has relatively higher pressure. Particles are then accelerated away from the higher-pressure region, causing the particles to transfer their energy to surrounding particles and propagating the wave. Acoustic pressure is a non-directional (scalar) quantity, whereas particle motion is an inherently directional quantity (a vector). The total energy of the sound wave includes the potential energy associated with the sound pressure, as well as the kinetic energy from particle motion.

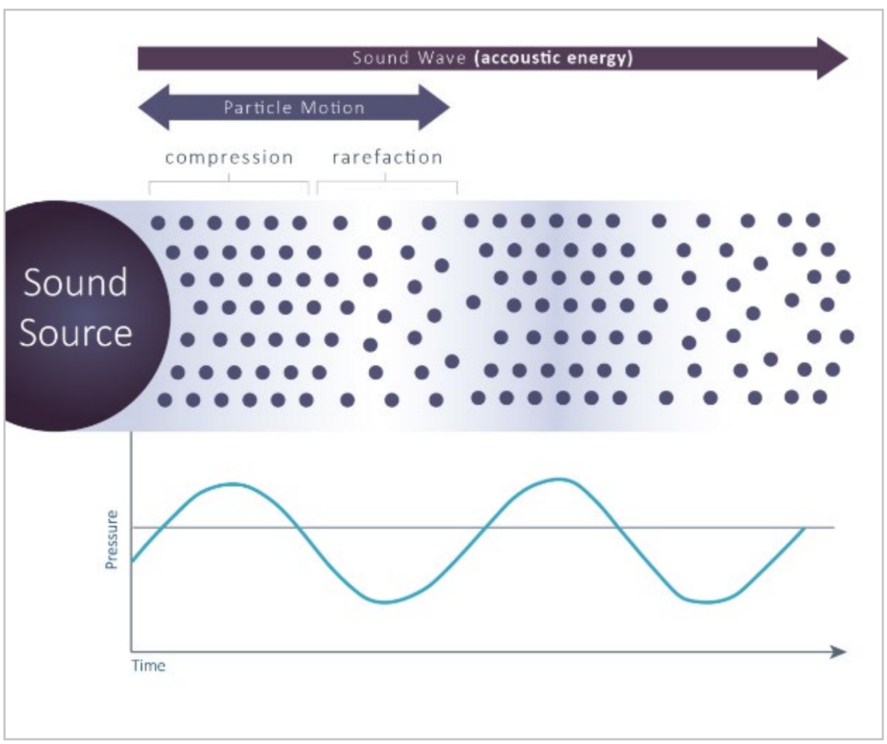
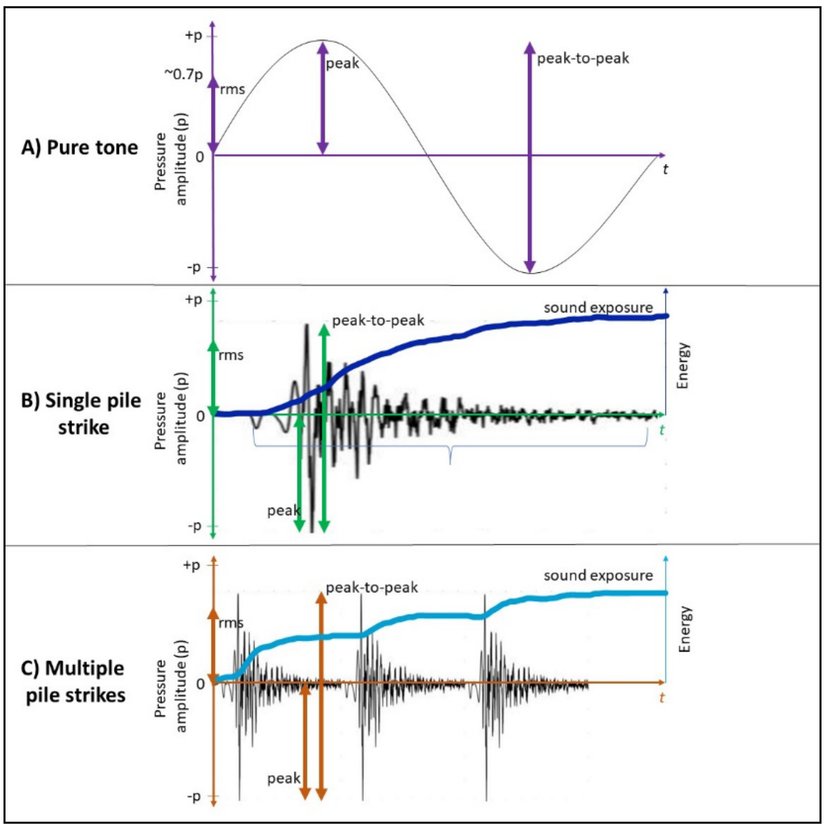


Figure B-20: Basic Mechanics of a Sound Wave

B.4.3 Units of Measurement

Sound can be quantified and characterized based on a number of physical parameters. A complete description of the units can be found in ISO 18405:2017. Some of the major parameters and their International System of Units (in parentheses) are:

Acoustic pressure (pascal [Pa]): The values used to describe the acoustic (or sound) pressure are peak pressure, peak-to-peak pressure and root-mean-square (rms) pressure deviation. The peak sound pressure is defined as the maximum absolute sound pressure deviation within a defined time period and is considered an instantaneous value. The peak-to-peak pressure is the range of pressure change from the most negative to the most positive pressure amplitude of a signal (Figure B-21). Whereas the rms sound pressure represents a time-averaged pressure and is calculated as the square root of the mean (average) of the time-varying sound pressure squared over a given period (Figure B-21). The peak level (Lpk), peak-to-peak level (Lpk-pk), and sound pressure level (SPL) are computed by multiplying the logarithm of the ratio of the peak or rms pressures to a reference pressure (1 μPa in water) by a factor of 20 and are reported in decibels (dB).



A) A sine wave of a pure tonal signal with equal positive and negative peaks, so peak-to-peak is exactly twice the peak and rms (root-mean-square) is approximately 0.7 x peak. B) A single pile-driving strike with one large positive pulse and a large negative pulse that is not necessarily the same magnitude. In this example, the negative pulse is more extreme so is the reported peak value and peak-to-peak is less than double that. Sound exposure is shown as it accumulates across the time window. The final sound exposure would be considered the "single-shot" exposure and the rms value is that value divided by the duration of the pulse. C) Three consecutive pile-driving strikes with peak and peak-to-peak assessed the same way as in panel B). Sound exposure is shown accumulating across all three strikes and rms is the total sound exposure divided by the entire time window shown. The cumulative sound exposure for this series of signals would be considered the total energy from all three pile strikes.

Figure B-21: Sound Pressure Wave Representations of Four Metrics: Root-mean-square (rms), Peak (Lpk), Peak-to-peak (Lpk-pk), and Sound Exposure (SEL)

Particle velocity (m/s): Particle velocity describes the rate of change in position of an oscillating particle about its origin with respect to time. Similar to sound pressure, particle velocity is dynamic and changes as the particles move back and forth. Therefore, peak particle velocity and rms particle velocity can be used to describe this physical quantity. One major difference between sound pressure and particle velocity is that the former is a scalar (i.e., without a directional component) and the latter is a vector (i.e., includes both magnitude and direction). Particle acceleration can also be used to describe particle motion and is defined as the rate of change of velocity of a particle with respect to time. It is measured in units of meters per second squared, or m/s^2.

Sound exposure (pascal squared second): Sound exposure is proportional to the acoustic energy of a sound. It is the time-integrated squared sound pressure over a stated period or acoustic event (Figure B-21). Unlike sound pressure, which provides an instantaneous or time-averaged value of acoustic pressure, sound exposure is cumulative over a period of time.

Acoustic intensity (watts per square meter): Acoustic or sound intensity is the amount of acoustic energy that passes through a unit area normal to the direction of propagation per second. It is the product of the sound pressure and the sound velocity. With an idealized constant source, the pressure and particle velocity will vary in proportion to each other at a given location, but the intensity will remain constant.

Sound levels: There is an extremely wide dynamic range of values when measuring acoustic pressure in pascals, so it is customary to use a logarithmic scale to compress the range of values. Aside from the ease it creates for comparing a wide range of values, animals (including humans) perceive sound on a logarithmic scale. These logarithmic acoustic quantities are known as **sound levels** and are expressed in dB, which is the logarithm of the ratio of the measurement in question to a fixed reference value. Underwater acoustic sound pressure levels are referenced to a pressure of 1 micropascal (μPa) (equal to 10^{-6} Pa or 10^{-11} bar). Note: airborne sound pressure levels have a different reference pressure: 20 μPa.

The metrics previously described (sound pressure, particle velocity, sound exposure, and intensity) can also be expressed as levels, and are commonly used in this way:

- Root-mean-square SPL (in dB re 1 μPa)
- Peak pressure level (Lpk, in dB re 1 μPa)
- Peak-to-peak pressure level (Lpk-pk, in dB re 1 μPa)
- Sound exposure level (SEL, in dB re 1 $\mu Pa^2 s$)
- Particle velocity level (sound velocity level in dB re 1 nm/s)

As a note, there are a few commonly used time periods used for SEL, including a 24-hour period (SEL_{24h}; used in the United States for the regulation of noise impacts to marine mammals), or the duration of a single event, such as a single pile-driving strike or an airgun pulse, called the single strike SEL (SEL_{ss}). A sound exposure for some other period of time, such as the entire installation of a pile, may be written without a subscript (SEL), but to be meaningful, should always denote the duration of the event.

Source level*:* Another commonly discussed concept is source level. Source level is a representation of the amount of acoustic power radiated from the sound source being described. It describes how loud a particular source is in a way that can inform expected received levels at various ranges. It can be conceptualized as the product of the pressure at a particular location and the range from that location to a spherical (omnidirectional) source in an idealized infinite lossless medium. The source level is the sum of the received level and the propagation loss to that receiver. It is often discussed as what the received level would be 1 meter from the source, but this can lead to confusion as an actual measurement at 1 meter is likely to be impossible for large and/or non-spherical sources. The most common type is an SPL source level in units of dB re 1 μPa m, though in some circumstances an SEL source level (in dB re 1 $\mu Pa^2 m^2 s$) may be expressed; peak source level (in units of dB re 1 μPa m) may also be appropriate for some sources.

B.4.4 Propagation of Sound in the Ocean

Underwater sound can be described through a source-path-receiver model. An acoustic source emits sound energy that radiates outward and travels through the water and the seafloor. The sound level decreases with increasing distance from the acoustic source as the sound travels through the environment. The amount by which the sound levels decrease between the theoretical source level and a receiver is called propagation loss. Among other things, the amount of propagation loss that occurs depends on the source-receiver separation, the geometry of the environment the sound is propagating through, the frequency of the sound, the properties of the water column, and the properties of the seafloor and sea surface.

When sound waves travel through the ocean, they may encounter areas with different physical properties that will likely alter the propagation pathway of the sound, compared to a homogenous and boundary free environment. For example, near the ocean's surface, water temperature is usually higher, resulting in relatively fast sound speeds. As temperature decreases with increasing depth, the sound speed decreases. Sounds bend toward areas with lower speeds (Urick 1983). Ocean sound speeds are often slowest at mid-latitude depths of about 1,000 meters, and because of sound's preference for lower speeds, sound waves above and below this "deep sound channel" often bend toward it. Sounds originating in this layer can travel great distances. Sounds can also be trapped in the mixed layer near the ocean's surface (Urick 1983). Latitude, weather, and local circulation patterns influence the depth of the mixed layer, and the propagation of sounds near the surface is highly variable and difficult to predict.

At the boundaries near the sea surface and the seafloor, acoustic energy can be scattered, reflected, or attenuated depending on the properties at the surface (e.g., roughness, presence of wave activity, or bubbles) or seafloor (e.g., bathymetric features, substrate heterogeneity) (Urick 1983). For example, fine-grain sediments tend to absorb sounds well, while hard-bottom substrates reflect much of the acoustic energy back into the water column. The presence of ice on the ocean's surface can also affect sound propagation. For example, the presence of solid ice may dampen sound levels by scattering incident sounds. The effect will also depend on the thickness and roughness of the ice, among many other factors related to the ambient conditions. As a sound wave moves from a source to a receiver (i.e., an animal), it may travel on multiple pathways that may be direct, reflected, refracted, or a combination of these mechanisms, creating a complex pattern of transmission across range and depth. The patterns may become even more complicated in shallow waters due to repeated interactions with the surface and the bottom, frequency-specific propagation, and more heterogenous seafloor properties. All of these variables contribute to the difficulty in reliably predicting the sound field in a given marine environment at any particular time.

B.4.5 Sound Source Classification

In the current regulatory context, anthropogenic sound sources are categorized as either impulsive or non-impulsive, and either continuous or intermittent, based on their differing potential to affect marine species (NMFS 2018b). Specifically, when it comes to potential damage to marine mammal hearing, sounds are classified as either impulsive or non-impulsive, and when considering the potential to affect behavior or acoustic masking, sounds are classified as either continuous or intermittent.

Impulsive noises are characterized as having (ANSI S1.13-2005):

- Broadband frequency content;
- Fast rise-times and rapid decay times;
- Short durations (i.e., <1 second); and
- High peak sound pressures.

Whereas the characteristics of non-impulsive sound sources are less clear but may be:

- Variable in spectral composition, i.e., broadband, narrowband, or tonal;
- Longer rise-time/decay times, and longer total durations compared to an impulsive sound; or
- Continuous (e.g., vessel engine radiated noise), or intermittent (e.g., echosounder pulses).

It is generally accepted that sources like explosions, airguns, sparkers, boomers, and impact pile driving are impulsive and have a greater likelihood of causing hearing damage than non-impulsive sources (note: explosions are further considered for non-auditory injury. Impulsive sounds are more likely to induce physiological effects, including temporary threshold shift (TTS) and permanent threshold shift (PTS), than non-impulsive sounds with the same energy. This binary at-the-source classification of sound types, therefore, provides a conservative framework upon which to predict potential adverse hearing impacts to marine mammals.

For behavioral effects of anthropogenic sound on marine mammals, NMFS classifies sound sources as either intermittent or continuous (NMFS 2018). Continuous sounds, such as drilling or vibratory pile driving, remain “on,” i.e., producing sound, for a given period of time, though this is not well defined. An intermittent sound typically consists of bursts or pulses of sound on a regular on-off pattern, also called the duty cycle. Examples of intermittent sounds are those from scientific echosounders, sub-bottom profilers, and impact pile driving. It is important to recognize that these delineations are not always practical in application, as a continuous yet moving sound source (such as a vessel passing over a fixed receiver) could be considered intermittent from the perspective of the receiver.

In reality, animals will encounter many signals in their environment, which may contain many or all of these sound types, called complex sounds. Even for sounds that are impulsive at the source, as the signal propagates through the water, the degree of impulsiveness decreases (Martin et al. 2020). While there is evidence, at least in terrestrial mammals (Hamernik and Hsueh 1991), that complex sounds can be more damaging than continuous sounds of the same energy, there is not currently a regulatory category for this type of sound. One approach for assessing the impulsiveness of a sound that has gained attention is to compute the kurtosis of that signal. Kurtosis is a statistical measure that describes the prevalence of extreme values within a distribution of observations, in other words the “spikiness” of the data. By definition, a sound with a kurtosis value of 3 or less has very few extreme values and is generally considered Gaussian (i.e., normally distributed) noise. Martin et al. (2020) showed that a kurtosis value greater than 40 represents a distribution of observations with many extreme values and is very spiky. This generally describes an impulsive noise. A distribution of sound level observations from a time series with a kurtosis value somewhere in between these two values would be considered a complex sound.

B.4.6 Sound Sources Related to Offshore Wind

B.4.6.1 Geophysical and Geotechnical Surveys

Geophysical and geotechnical surveys are conducted to characterize the bathymetry, sediment type, and benthic habitat characteristics of the marine environment. They may also be used to identify archaeological resources or obstacles on the seafloor. These types of surveys occur in the site assessment phase in order to inform the placement of offshore wind foundations, but may also occur intermittently during and after turbine construction to identify, guide, and confirm the locations of turbine foundations. The suite of HRG sources that may be used in geophysical surveys includes side-scan sonars, multibeam echosounders (MBES), magnetometers and gradiometers, parametric sub-bottom profilers, compressed high-intensity radiated pulses sub-bottom profilers, boomers, and/or sparkers. Seismic airguns are not expected to be used for offshore wind applications. These HRG sources may be towed behind a ship, mounted on a ship's hull, or deployed from remotely operated vehicles or automated underwater vehicles.

Many HRG sources are active acoustic sources, meaning they produce sound deliberately to obtain information about the environment. With the exception of some MBES and side-scan sonars, they produce sounds below 180 kilohertz (kHz) and thus may be audible to marine species. Source levels vary widely depending on source type and operational power level used, from approximately 145 dB re 1 µPa m for towed sub-bottom profilers up to 245 dB re 1 µPa m for some MBES (Crocker and Fratantonio 2016). Generally speaking, sources that emit sound in narrow beams directed at the seafloor are less likely to affect marine species because they ensonify a smaller portion of the water column, thus reducing the likelihood that an animal encounters the sound (Ruppel et al. 2022). While sparkers are omnidirectional, most other HRG sources have narrower beamwidths (e.g., MBES: up to 6 degrees, parametric sub-bottom profilers: 30 degrees, boomers: 30 degrees to 90 degrees) (Crocker and Fratantonio 2016). Most HRG sources emit short pulses of sound, with periods of silence in between. This means that only several "pings" emitted from a vessel towing an active acoustic source would reach an animal below, even if the animal was stationary (Ruppel et al. 2022). HRG surveys may occur throughout the construction area with the potential for greater effort in some areas.

Geotechnical surveys may use vibracores, jet probes, bottom-grab samplers, deep borings, or other methods to obtain samples of sediments at each potential turbine location and along the cable route. For many of these methods, source levels have not been measured, but it is generally assumed that low-frequency, low-level noise will be introduced as a byproduct of these actions. It is likely that the sound of the vessel will exceed that generated by the geotechnical method itself.

B.4.6.2 Unexploded Ordnance Detonations

UXOs may be discovered on the seabed in offshore wind lease areas or along export cable routes. While non-explosive methods may be employed to lift and move these objects, some may need to be detonated. Underwater explosions of this type create shock waves characterized by extreme changes in pressure, both positive and negative. Shock waves are supersonic, so they travel faster than the speed of sound. The explosive sound field extremely is complex, especially in shallow waters. In 2015, von Benda-Beckmann et al. 2015 measured received levels of explosions in shallow waters at distances ranging from 100 to 2,000 meters from the source, in water depths ranging from 6 to 22 meters. The measured SEL from the explosive removal of a 263-kilogram charge was 216 dB re 1 µPa^{2}s at a distance of 100 meters and 196 dB re 1 µPa^{2}s at 2,000 meters. They found that SELs were lower near the surface than near the seafloor or in the middle of the water column, suggesting that if an animal is near the surface, the effects may be less damaging. Most of the acoustic energy for underwater explosions is below 1,000 Hz.

As an alternative to traditional detonation, a newer method called deflagration allows for the controlled burning of underwater ammunition. Typically, a remotely operated vehicle uses a small, targeted charge to initiate rapid burning of the ordnance; once this process is complete, the remaining debris can be cleared away. Recent work has demonstrated that both Lpk and SEL measured from deflagration events may be as much as 20 dB lower than equivalently sized high-order detonations (Robinson et al. 2020).

B.4.6.3 Impact and Vibratory Pile Driving

At present, the installation of turbine foundations is largely done using pile driving. There are several techniques, including impact and vibratory driving, and many pile designs and sizes, including monopile and jacket foundations. Impact pile driving employs a hammer to strike the pile head and force the pile into the sediment with a typical hammer strike rate of approximately 30 to 50 strikes/minute. Typically, force is applied over a period of less than 20 milliseconds, but the pile can generate sound for upwards of 0.5 seconds. Pile-driving noise is characterized as impulsive because of its high peak pressure, short duration, and rapid onset time. Underwater sound levels generated during pile driving depend on many factors including the pile material and size, characteristics of the substrate, penetration of the pile in the seabed, hammer energy and size, and water depth. Currently the design envelope for most offshore wind turbine installations anticipates hammer energy between 2,500 and 4,000 kilojoule (kJ), but generally speaking, with increasing pile diameter, greater hammer energy is used. The propagation of pile-driving sounds depends on factors such as the sound speed in the water column (influenced by temperature, salinity, and depth), the bathymetry, and the composition of sediments in the seabed and will therefore vary among sites. Due to variation in these features, sounds may not radiate symmetrically outward from a pile.

Thus far, there are only a few measurements from construction of offshore wind turbines in U.S. waters. Two monopiles (7.8 meters in diameter) were installed off the coast of Virginia (27-meter water depth) in 2020. Dominion Energy (2020) recorded sounds during this process; without noise mitigation, Lpk source levels were back-calculated to be 221 dB re 1 µPa m, but with a double bubble curtain, Lpk source levels were around 212 dB re 1 µPa m. The unmitigated SPL source level was 213 dB re 1 µPa m; the mitigated SPL source level was 204 dB re 1 µPa m.

Jacket foundations are also common, if not for the main turbine structures, for other structures associated with the wind farm such as the offshore substations. Jacket foundations are installed using pin piles which are generally significantly smaller than monopiles, on the order of 2 to 5 meters in diameter, but more pin piles are needed per foundation. The sound levels generated will vary depending on the pile material, size, whether the piles are installed with the jacket in place, substrate, hammer energy, and water depth. At the Block Island Wind Farm, Amaral et al. (2018a) measured sound levels at various distances during pile driving of jacket foundations (50-inch pile diameter, 30-meter water depth). It should be noted that the piles were installed at an angle (from vertical), which influenced the directionality of the noise produced, so caution is encouraged with interpretation. Nonetheless, the authors reported SPL received levels between 150 to 160 dB re 1 µPa at approximately 750 meters from the piles. The maximum SEL_{SS} measured at 750 meters from the jacket foundations at Block Island Wind Farm ranged from 160 to 168 dB re 1 $\mu Pa^2 s$, nearly 10 dB lower than Coastal Virginia Offshore Wind. Using measurements combined with acoustic modeling, the peak-peak source levels for pile driving at Block Island Wind Farm were estimated to be between 233 and 245 dB re 1 µPa m (Amaral et al. 2018b).

Vibratory hammers may be used as an alternative to impact pile driving. The vibratory hammer continuously exerts vertical vibrations into the pile, which causes the sediment surrounding the pile to liquefy, allowing the pile to penetrate the substrate. The vibratory hammer typically oscillates at a frequency of 20 to 40 Hz (Matuschek and Betke 2009) and produces most of its acoustic energy below 2 kHz. Buehler et al. (2015) measured sound levels at 10 meters distance from a 72-inch steel pile, and found them to be 185 dB re 1 µPa, but this is significantly smaller than the sizes expected for offshore wind. While no measurements of vibratory piling for large monopiles have been conducted, modeling predictions from South Coast Wind, for example, estimate that SPL received levels could exceed the behavioral harassment threshold for marine mammals (120 dB re 1 μPa) at distances >40 kilometers for a 16-meter-diameter monopile (LGL Ecological Research Associates 2022). Vibratory pile driving is a non-impulsive sound source and the hammer produces sound continuously, so different criteria are used for assessing behavioral and physiological effects on marine mammals (Section B.5.4).

A technique that is quickly gaining use for installation in hard rock substrates is down-the-hole (DTH) pile driving, which uses a combination of percussive and drilling mechanisms, with a hammer acting directly on the rock to advance a hole into the rock, and also advance the pile into that hole (Guan et al. 2022). Noise characteristics for DTH pile driving include both impulsive and non-impulsive components. The impulsive component of the DTH pile driving is the result of a percussive hammer striking the bedrock, while the non-impulsive component is from drilling and air-lifting of cuttings and debris from the pile. While only limited studies have been conducted on DTH pile-driving noise, its characteristics strongly resemble those of impact pile driving, but with a higher hammer striking rate (approximately 10 to 15 Hz). The dominant frequencies from DTH pile driving are below 2 kHz, similar to conventional impact pile driving. Due to the high rate of hammer striking, along with the sounds of drilling and debris clearing out, sound levels in between the pulses are much higher than conventional impact pile driving (Guan et al. 2022).

Various noise abatement technologies, such as bubble curtains, arrays of enclosed air resonators, or segmented nets of rubber or foam, may be employed to reduce noise from impact pile driving. Measurements from European wind farms have shown that a single noise abatement system can reduce broadband sound levels by 10 to 15 dB, while using two systems together can reduce sound levels as much as 20 dB (Bellmann et al. 2020). Based on Realtime Opportunity for Development Environmental Observations measurements from Coastal Virginia Offshore Wind, double Big Bubble Curtains are shown to be most effective for frequencies above 200 Hz, and greater noise reduction was seen in measurements taken in the middle of the water column compared to those near the seabed. Approximate sound level reduction is 3 to 5 dB below 200 Hz, and 8 to 20 dB above 200 Hz, depending on the characteristics of the bubble curtain (Amaral et al. 2020).

B.4.6.4 Drilling

Drilling associated with offshore wind activities may include geotechnical surveys, horizontal directional drilling (HDD) at the export cable landfalls, and, if necessary, to remove large boulders at the site of foundation installation or during foundation installation to reduce the risk of pile run. Sounds from drilling are generally considered to be non-impulsive and are nearly continuous in nature, though they may be highly variable depending on the type of substrate that is encountered (Richardson et al. 1995). There could be tonal sound generated by the drill bit, mechanical noise transferred through the ship's hull, and noise from the vessels and dynamic positioning (DP) systems. HDD uses equipment that is generally located on shore, and the sound that propagates into the water is expected to be negligible. Geotechnical drilling SPLs (in the 30 to 2,000 Hz band) have been measured up to 145 dB re 1 μPa m from a jack-up platform (Erbe and McPherson 2017), and up to 162 dB re 1 μPa m from an anchored drilling vessel (Huang et al. 2023). If drilling is required for foundation installation, a large drill bit at the bottom of the pile would slowly rotate to break up the material inside the pile, and the liquefied material would be pumped out. While measurements of these operations specifically for offshore wind installation have not been conducted, the closest proxy is from oil and gas-related operations, where a 6-meter-diameter drill bit was used for the excavation of mudline cellars (Austin et al. 2018). Austin et al. (2018) measured received levels at 1,000 meters from the operations and back-calculated the SPL source levels to be between 191 to 193 dB re 1 μPa m.

B.4.6.5 Vessels

During construction, small vessels and aircraft may be used to transport crew and equipment, and large vessels will be used to conduct pile driving, using DP systems. DP is the process by which a vessel holds station over a specific seafloor location for some time period using input from gyrocompasses, motion sensors, Global Positioning System, active acoustic positioning systems, and wind sensors to determine relative movement and environmental forces at work. Generally speaking, most acoustic energy from DP is below 1,000 Hz, often below 50 Hz, with tones related to engine and propeller size and type. The sound can also vary directionally, and this directionality is much more pronounced at higher frequencies. Because this is a dynamic operation, the sound levels produced will vary based on the specific operation, DP system used (e.g., jet or propeller rotation, versus a rudder or steering mechanism), and factors such as the blade rate and cavitation, in some cases. Representative sound field measurements from the use of DP are difficult to obtain because the sound transmitted is often highly directional and context specific. The direction of sound propagation may change as different DP needs requiring different configurations are applied.

Several studies have found that the measured sound levels of DP alone are, counterintuitively, higher than those of DP combined with the intended activities such as drilling (Jiménez-Arranz et al. 2020; Kyhn et al. 2011; Nedwell and Edwards 2004) and coring (Warner and McCrodan 2011). Nedwell and Edwards (2004) reported that DP thrusters of the semi-submersible drill rig Jack Bates produced periodic noise (corresponding to the rate of the thruster blades) with most energy between 3 to 30 Hz. The received SPL measured at 100 meters from the vessel was 188 dB re 1 µPa. Warner and McCrodan (2011) found that most DP-related sounds from the self-propelled drill ship, R/V Fugro Synergy, were in the 110 to 140 Hz range, with an estimated source level of 169 dB re 1 µPa·m. Sounds in this frequency range varied by 12 dB during DP, while the broadband levels, which also included diesel generators and other equipment sounds, varied by only 5 dB over the same time period (Warner and McCrodan 2011). All of the above sources report high variability in levels with time. This is due in part to the intermittent usage and relatively slow rotation rates of thrusters used in DP. It is also difficult to provide a realistic range of source levels from the data thus far because most reports do not identify the direction from which sound was measured relative to the vessel, and DP thrusters are highly directional systems.

The active acoustic positioning systems used in DP can be additional sources of high-frequency sound. These systems usually consist of a transducer mounted through the vessel's hull and one or more transponders affixed to the seabed. Kongsberg High Precision Acoustic Positioning systems produce pings in the 10 to 32 kHz frequency range. The hull-mounted transducers have source levels of 188 to 206 dB re 1 µPa·m depending on adjustable power settings (Kongsberg Maritime AS 2013). The fixed transponders have maximum source levels of 186 to 206 dB re 1 µPa m depending on model and beam width settings from 15 to 90 degrees (Jiminez-Arranz et al. 2020). These systems have high source levels, but beyond 2 kilometers, they are generally quieter than other components of the sound from DP vessels for various reasons including: their pulses are produced in narrowly directed beams, each individual pulse is very short and their high-frequency content leads to faster attenuation.

Noise from vessel transit is different from that of DP systems, but is also considered to be continuous, with a combination of broadband and tonal sounds (Richardson et al. 1995; Ross 1976). Transiting vessels generate continuous sound from their engines, propeller cavitation, onboard machinery, and hydrodynamics of water flow (Ross 1976). The actual radiated sound depends on several factors, including the type of machinery on the ship, the material conditions of the hull, how recently the hull has been cleaned, interactions with the sea surface, and shielding from the hull, which reduces sound levels in front of the ship.

In general, vessel noise increases with ship size, power, speed, propeller blade size, number of blades, and rotations per minute. Source levels for large container ships can range from 177 to 188 dB re 1 µPa m

(McKenna et al. 2013) with most energy below 1 kHz. Smaller vessels typically produce higher-frequency sound concentrated in the 1 to 5 kHz range. Kipple and Gabriele (2003) measured underwater sound from vessels ranging from 14 to 65 feet long (25 to 420 horsepower) and back-calculated source levels to be 157 to 181 dB re 1 µPa m. Similar levels are reported by Jiménez-Arranz et al. (2020), who provide a review of measurements for support and crew vessels, tugs, rigid hull inflatable boats, icebreakers, cargo ships, oil tankers, and more.

During transit to and from shore bases, survey vessels typically travel at speeds that optimize efficiency, except in areas where transit speed is restricted. The vessel strike speed restrictions that are in place along the Atlantic OCS are expected to offer a secondary benefit of underwater noise reduction. For example, recordings from a speed reduction program in the Port of Vancouver (210- to 250-meter water depths) showed that reducing speeds to 11 knots reduced vessel source levels by 5.9 to 11.5 dB, depending on the vessel type (MacGillivray et al. 2019). Vessel noise is also expected to be lower during geological and geophysical surveys, as they typically travel around 5 knots when towing instruments.

B.4.6.6 Site Preparation

Prior to offshore wind project foundation and export cable installation, boulder clearance and pre-lay grapnel runs may be conducted to clear the area of obstructions. This may involve the use of a displacement plow, a subsea grab or, in shallower waters, a backhoe dredger. Sandwave clearance may also be conducted in advance of export cable installation to remove mobile sediments using a suction hopper dredger, controlled flow excavation, or plow. At landfall locations, export cables may be installed using HDD, which may require mechanical dredging of the HDD exit pit.

Sounds from site preparation activities are considered non-impulsive and are nearly continuous in nature. Dredging produces distinct sounds during each specific phase of operation: excavation, transport, and placement of dredged material (Central Dredging Association 2011; Jiminez-Arranz et al. 2020). Engines, pumps, and support vessels used throughout all phases may introduce low-level, continuous noise into the marine environment. The sounds produced during excavation vary depending on the sediment type—the denser and more consolidated the sediment is, the more force the dredger needs to impart, and the higher sound levels that are produced (Robinson et al. 2011). Sounds from mechanical dredges occur in intervals as the dredge lowers a bucket, digs, and raises the bucket with a winch. During the sediment transport phase, many factors—including the load capacity, draft, and speed of the vessel—influence the sound levels that are produced (Reine et al. 2014). SPL source levels during backhoe dredge operations range from 163 to 179 dB re 1 µPa m (Nedwell et al. 2008; Reine et al. 2012). As a whole, dredging activities generally produce low-frequency sounds; with most energy below 1,000 Hz and frequency peaks typically occurring between 150 to 300 Hz (McQueen et al. 2018). Additional detail and measurements of dredging sounds can be found in (Jiminez-Arranz et al. 2020; McQueen et al. 2018; Robinson et al. 2011a).

B.4.6.7 Cable Laying and Trenching

The installation of cables can be done by towing a tool behind the installation vessel to simultaneously open the seabed and lay the cable, or by laying the cable and following with a tool to embed the cable. Possible installation methods for these options include jetting, vertical injection, control flow excavation, trenching, and plowing. Burial depth of the cables is typically 1 to 2 meters. Cable installation vessels may use DP to lay the cables which can introduce considerable levels of noise into the marine environment (Section B.4.6.5).

Nedwell and Edwards (2004) measured sounds from a 130-meter-long trenching vessel and found that sound levels were similar to those produced during pipeline-laying in the same area, with the exception of a 20 kHz tonal sound, which they attributed to the vessel’s DP thrusters. Nedwell et al. (2003) recorded underwater sound 160 meters away from trenching activity (water depth 7 to 11 meters) and back-calculated the SPL source level of trenching to be 178 dB re 1 µPa m (assuming propagation loss of 22logR). They described the sound as generally spanning a wide range of frequencies, variable over time, and accompanied by some tonal machinery noise and transient noises associated with rock breakage.

Johansson and Andersson (2012) recorded underwater noise levels during both pipelaying and trenching. The mean SPL measured (at 1,500 meters from the pipeline) during pipelay operations was 130.5 dB re 1 µPa, nearly 20 dB higher than average background noise at the same location. There were eight support vessels in the vicinity during pipelaying operations. During trenching, with only one vessel in the vicinity, received levels were 126 dB re 1 µPa, and the authors back-calculated the SPL source level to be 183.5 dB re 1 µPa, similar to that of commercial vessels in the region.

B.4.6.8 Aircraft

Manned aircraft consist of propeller and jet engines, fixed-wing craft, as well as helicopters. Unmanned systems also exist. For jet engine aircraft, the engine is the primary source of sound. For propeller driven aircraft and helicopters, the propellors and rotors also produce noise. Aircraft generally produce low-frequency sound below 500 Hz (Richardson et al. 1995). While aircraft noise can be substantial in air, penetration of aircraft noise into the water is limited because much of the noise is reflected off the water's surface (Richardson et al. 1995). The noise that penetrates into the water column does so via a critical incident angle or cone. With an idealized flat sea surface, the maximum critical incident angle is approximately 13 degrees (Urick 1983); beyond this, sound is reflected off the surface. When the sea surface is not flat, there may be some additional penetration into the water column in areas outside of this 13-degree cone. Nonetheless, the extent of noise from passing aircraft is more localized in water than it is in air.

Jiménez-Arranz et al. (2020) and Richardson et al. (1995) reviewed sound measurements recorded below passing aircraft of various models. These SPL measurements included 124 dB re 1 µPa (dominant frequencies between 56 to 80 Hz) from a maritime patrol aircraft with an altitude of 76 meters, 109 dB re 1 µPa (dominant frequency content below 22 Hz) from a utility helicopter with an altitude of 152 meters, and 107 dB re 1 µPa (tonal, 82 Hz) from a turbo propeller with an altitude of 457 meters. Recent published levels associated with unmanned aircraft (Christiansen et al. 2016; Erbe et al. 2017) indicate source levels are around or below 100 dB re 1 µPa m.

B.4.6.9 WTG Operations

Once windfarms are operational, low-level sounds are generated by each WTG, but sound levels are much lower than during construction. This type of sound is considered to be continuous, omnidirectional radially from the pile, and non-impulsive. Most of the energy associated with operations is below 120 Hz. Sound levels from wind turbine operations are likely to increase somewhat with increasing generator size and power ratings, as well as with wind speeds. Recordings from Block Island Wind Farm indicated that there was a correlation between underwater sound levels and increasing wind speed, but this was not clearly influenced by turbine machinery; rather it may have been explained by the natural effects that wind and sea state have on underwater sound levels (Elliott et al. 2019; Urick 1983).

A recent compilation (Tougaard et al. 2020) of operational noise from several wind farms, with turbines up to 6.15 MW in size, showed that operational noise generally attenuates rapidly with distance from the turbines (falling to near ambient sound levels within approximately 1 kilometer from the source), and the combined noise levels from multiple turbines is lower or comparable to that generated by a small cargo ship. Tougaard et al. (2020) developed a formula predicting a 13.6 dB increase for every 10-fold increase in WTG power rating. This means that operational noise could be expected to increase by 13.6 dB when increasing in size from a 0.5 MW turbine to a 5 MW one, or from 1 MW to 10 MW. The least squares fit of that dataset would predict that the SPL measured 100 meters from a hypothetical 15 MW turbine in operation in 10 meters per second (m/s) (19 knots or 22 miles per hour) wind would be 125 dB re 1 μPa. However, all of the 46 data points in that dataset, with the exception of the two from Block Island Wind Farm, were from WTGs operated with gear boxes of various designs rather than the newer use of direct drive technology, which is expected to lower underwater noise levels significantly. Stöber and Thomsen (2021) make predictions for source levels of 10 MW turbines based on a linear extrapolation of maximum received levels from WTGs with ratings up to 6.15 MW. The linear fit is likely inappropriate, and the resulting predictions may be exaggerated. Tougaard et al. (2020) point out that received level differences among different pile types could be confounded by differences in water depth and turbine size. In any case, additional data is needed to fully understand the effects of size, foundation type properties (e.g., structural rigidity and strength), and drive type on the amount of sound produced during turbine operation.

B.4.6.10 Decommissioning

The methods that may be used for decommissioning are not well understood at this time. It is possible that explosives may be used for some offshore wind projects (Section B.4.6.2), but are not being considered under Alternative B of this Final EIS. However, given the general trend of reducing the use of underwater explosives that has been observed in the oil and gas industry, it is likely that offshore wind structures will instead be removed by cutting. While it is difficult to extrapolate directly, we can glean some insights from a recent study which measured received sound levels during the mechanical cutting of well conductor casings on oil and gas platforms in California. The cutters operated at 60 to 72 revolutions per minute, and the cutting time varied widely between cuts (on the order of minutes to hours). At distances of 106 to 117 meters from the cutting, received SPLs were 120 to 130 dB re 1 μPa, with most acoustic energy falling between 20 and 2,000 Hz (Fowler et al. 2022). This type of sound is considered to be non-impulsive and could be continuous while cuts are actually being made, with quieter periods between cuts. Additional noise from vessels (Section B.4.6.5) and other machinery may also be introduced throughout the decommissioning process.

B.5 Marine Mammals and Underwater Sound

B.5.1 The Importance of Sound to Marine Mammals

Marine mammals rely heavily on acoustic cues for extracting information from their environment. Sound travels faster and farther in water (approximately 1,500 m/s) than it does in air (approximately 350 m/s), making this a reliable mode of information transfer across large distances and in dark environments where visual cues are limited. Acoustic communication is used in a variety of contexts, such as attracting mates, communicating to young, or conveying other relevant information (Bradbury and Vehrencamp 2011). Marine mammals can also glean information about their environment by listening to acoustic cues, like ambient sounds from a reef, the sound of an approaching storm, or a call from a nearby predator. Finally, toothed whales produce and listen to echolocation clicks to locate food and to navigate (Madsen and Surlykke 2013).

B.5.2 Hearing Anatomy

Like terrestrial mammals, the auditory anatomy of marine mammals generally includes the inner, middle, and outer ear (Ketten 1994). Not all marine mammals have an outer ear, but if it is present, it funnels sound into the auditory pathway. The middle ear acts as a transformer, filtering and amplifying the sound. The inner ear is where auditory reception takes place. The key structure in the inner ear responsible for auditory perception is the cochlea, a spiral-shaped structure containing the basilar membrane, which is lined with auditory hair cells. Specific areas of the basilar membrane vibrate in response to the frequency content of the acoustic stimulus, causing hair cells mapped to specific frequencies to be differentially stimulated and send signals to the brain (Ketten 1994). While the cochlea and basiliar membrane are well conserved structures across all mammalian taxa, there are some key differences in the auditory anatomy of terrestrial versus marine mammals that require explanation. Marine mammals have the unique need to hear in aqueous environments. Amphibious marine mammals (including seals, sea otters, and sea lions) have evolved to hear both in air and under water, and all except phocid pinnipeds have external ear appendages. Cetaceans do not have external ears, do not have air-filled external canals, and the bony portions of the ear are much denser than those of terrestrial mammals (Ketten 1994).

All marine mammals have binaural hearing and can extract directional information from sound, but the pathway that sound takes into the inner ear is not well understood for all cetaceans and may not be the same for all species. For example, in baleen whales, bone conduction through the lower jaw may play a role in hearing (Cranford and Krysl 2015), while odontocetes have a fat-filled portion of the lower jaw which is thought to funnel sound toward the ear (Mooney et al. 2012). Hearing tests have been conducted on several species of odontocetes, but there has yet to be a hearing test on a baleen whale, so most understanding comes from examining the ears from deceased whales (Erbe et al. 2016; Houser et al. 2017). However, work is currently being undertaken to collect measures of minke whale hearing in Norway, though results have not yet been published (NMMF 2023).

Many marine mammal species produce sounds through vibrations in their larynx (Frankel 2002). In baleen whales, for example, air in the lungs and laryngeal sac expands and contracts, producing vibrations and sounds within the larynx (Frankel 2002). Baleen whales produce low-frequency sounds that can be used to communicate with other animals over great distances (Clark and Gagnon 2002). Differences in sound production among marine mammals varies, in part, with their use of the marine acoustic environment. Toothed whales hunt for their prey using relatively high-frequency (10s of kHz) echolocation signals. To produce these signals, they have a specialized structure called the “melon” in the top of their head that is used for sound production. When air passes through the phonic lips, a vibration is produced, and the melon helps transmit the vibration from the phonic lips to the environment as a directed beam of sound (Frankel 2002). It is generally believed that if an animal produces and uses a sound at a certain frequency, its hearing sensitivity will at least overlap those particular frequencies. An animal’s hearing range is likely much broader than this, as they rely heavily on acoustic information, beyond the signals they produce themselves, to understand their environment.

B.5.3 Potential Impacts of Underwater Sound

Depending on the level of exposure, the context, and the type of sound, potential impacts of underwater sound on marine mammals may include non-auditory injury, permanent or temporary hearing loss, behavioral changes, acoustic masking, or increases in physiological stress (OSPAR Commission 2009). Each of these impacts is discussed below.

Non-auditory Injury: Non-auditory physiological impacts are possible for very intense sounds or blasts, such as explosions. This kind of impact is not expected for most of the activities associated with offshore wind development; it is only possible during detonation of unexploded ordnances or if explosives are used in decommissioning. Although many marine mammals can adapt to changes in pressure during their deep foraging dives, the shock waves produced by explosives expose the animal to rapid changes in pressure, which in turn cause a rapid expansion of air-filled cavities (e.g., the lungs). This forces the surrounding tissue or bone to move beyond its limits, which may lead to tears, breaks, or hemorrhaging. The extent and severity to which such injury will occur depends on several factors, including the size of these air-filled cavities, ambient pressure, how close an animal is to the blast, how large the blast is, and the animal’s mass (U.S. Navy 2017). In extreme cases, this can lead to severe lung damage, which can directly kill the animal. A less severe lung injury may indirectly lead to death due to an increased vulnerability to predation or the inability to complete foraging dives.

Permanent or Temporary Hearing Loss: An animal's auditory sensitivity to a sound depends on the spectral, temporal, and amplitude characteristics of the sound (Richardson et al. 1995). When exposed to sounds of significant duration and amplitude (typically within close range of a source), marine mammals may experience noise-induced threshold shifts. PTS is an irreversible loss of hearing due to hair cell loss or other structural damage to auditory tissues (Henderson et al. 2008; Saunders et al. 1985). TTS is a relatively short-term (e.g., within several hours or days), reversible loss of hearing following noise exposure (Finneran 2015; Southall et al. 2007), often resulting from hair cell fatigue (Saunders et al. 1985; Yost 2000). While experiencing TTS, the hearing threshold rises, meaning that a sound must be louder in order to be detected. Prolonged or repeated exposure to sounds at levels that are sufficient to induce TTS—without adequate recovery time—can lead to PTS (Finneran 2015b; Southall et al. 2007). Research suggests that some odontocete species may have mechanisms to reduce their hearing sensitivity, which may help to protect them from PTS or TTS when provided with a warning signal that an intense sound is just about to arrive (Nachtigall and Supin 2013).

Behavioral Impacts: Farther away from a source and at lower received levels, marine mammals may show varying levels of behavioral disturbance to noise beginning at distances farther from a sound source at lower received levels than those associated with hearing loss. Behavioral effects may range from no observable response to overt behavioral changes. They may flee from an area to avoid the noise source, may exhibit changes in vocal activity, stop foraging, or change their typical dive behavior, among other responses (National Research Council 2003). When exposed to the same sound repeatedly, it is possible that marine mammals may become either habituated (show a reduced response) or sensitized (show an increased response) (Bejder et al. 2009). A number of contextual factors play a role in whether an animal exhibits a response to a sound source, including those intrinsic to the animal and those related to the sound source. Some of these factors include: (1) the exposure context, e.g., behavioral state of the animal, habitat characteristics; (2) the biological relevance of the signal, e.g., whether the signal is audible, whether the signal sounds like a predator; (3) the life stage of the animal, e.g., juvenile, mother and calf; (4) prior experience of the animal, e.g., is it a novel sound source; (5) sound properties, e.g., duration of sound exposure, SPL, sound type, mobility/directionality of the source; and (5) physical properties of the medium that may affect how the sound propagates, e.g., bathymetry, temperature, salinity (Southall et al. 2021). Because of these many factors, behavioral impacts are challenging to both predict and measure, and this remains an ongoing field of study within the field of marine mammal bioacoustics. Furthermore, the implications of behavioral disturbance can range from, as an example, temporary displacement of an individual to long-term consequences on a population, such as a reduction in fitness related to decreased foraging success.

Auditory Masking: Auditory masking may occur over larger spatial scales than noise-induced threshold shift or behavioral disturbance. Masking occurs when a noise source overlaps in time, space, and frequency as a signal that the animal is either producing or trying to detect in its environment (Clark et al. 2009; Richardson et al. 1995). Masking can reduce an individual's "communication space" (the range at which it can effectively transmit and receive acoustic cues from conspecifics) or "listening space" (the range at which it can detect relevant acoustic cues from the environment). A growing body of research is focused on the risk of masking from anthropogenic sources, the ecological significance of masking, and what anti-masking strategies may be used by marine animals. This understanding is essential to fully address masking in regulation or mitigation approaches (Erbe et al. 2016). In the interim, most assessments only consider the overlap in frequency between the sound source and the hearing range of marine mammals.

Physiological stress: The presence of anthropogenic noise, even at low levels, can increase physiological stress in a range of taxa, including humans (Kight and Swaddle 2011; Wright et al. 2007). This is difficult to measure in wild animals, but several methods have recently emerged that allow for reliable measurements in marine mammals (Hunt et al. 2014). For example, animals tagged with heart rate monitors and the collection of fecal and blubber samples can be used to address questions about near real-time stressors (Rolland et al. 2005). For NARWs, vessel noise is known to increase stress hormone levels, which may contribute to suppressed immunity and reduced reproductive rates and fecundity (Rolland et al. 2012). For narwhal (*Monodon monoceros*), increased vessel traffic contributed to increased stress hormone levels (Watt et al. 2021). Furthermore, a paradoxical physiological response to vessel and seismic airgun noise was reported in tagged narwhal displaying simultaneous bradycardia with increased fluke stroke and respiration rates (Williams et al. 2022). The reactions to anthropogenic noise by this deep-diving cetacean demonstrated how a cascade of effects along the entire oxygen pathway could challenge physiological homeostasis especially if disturbance is prolonged (Williams et al. 2022).

The effects of anthropogenic sound on marine life have been studied for more than half a century. In that time, it has become clear that this is a complex subject with many interacting factors and extreme variability in response from one sound source to another and from species to species, and even within species, i.e., individuals may have markedly different responses to a similar exposure. But some general trends have emerged from this body of work. First, the louder and more the received sound is, the higher the likelihood that there will be an adverse physiological effect, such as PTS or TTS. These impacts generally occur at relatively close distances to a source, in comparison to behavioral effects, masking, or increases in stress, which can occur wherever the sound can be heard. Secondly, the hearing sensitivity of an animal plays a major role in whether it will be affected by a sound or not, and there is a wide range of hearing sensitivities among marine mammal species. Regulation to protect marine life from anthropogenic sound has formed around these general concepts.

B.5.4 Marine Mammal Acoustic 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 2023) and Letter of Authorization (LOA) application (JASCO 2023). Table B-26 summarizes the NMFS threshold criteria for PTS and Level A harassment used in the model.

[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.

Table B-26: 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 2023

μPa = micropascal; μPa^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 μPa^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). NMFS currently recommends an SPL threshold for behavioral disturbance of 160 dB re 1 μPa for non-explosive impulsive sounds (e.g., airguns and impact pile driving) and intermittent sound sources (e.g., scientific and non-tactical sonar), and 120 dB re 1 μPa for continuous sounds (e.g., vibratory pile driving, drilling, etc.) (NMFS 2023b). This is an “unweighted” criterion that is applicable for all marine mammal species. In-air behavioral thresholds exist for harbor seals and non-harbor seal pinnipeds at 90 dB re 20 μPa SPL and 100 dB re 20 μPa SPL, respectively (NMFS 2023b). Unlike with sound exposure level-based thresholds, the accumulation of acoustic energy over time is not relevant for this criterion—meaning that exposures to noise above the behavioral disturbance threshold can occur even if an animal experiences a received SPL of 160 dB re 1 μPa very briefly in one instance.

While the behavioral disturbance threshold is generally applied in a binary fashion, as alluded to previously, there are numerous factors that determine whether an individual will be affected by a sound, resulting in substantial variability even in similar exposure scenarios. In particular, it is recognized that the context in which a sound is received affects the nature and extent of responses to a stimulus (Ellison et al. 2012; Southall et al. 2007). Therefore, a “step function” concept for behavioral disturbances was introduced by Wood et al. (2012) whereby proportions of exposed individuals experience behavioral disturbance at different received levels, centered at an SPL of 160 dB re 1 μPa. These probabilistic thresholds reflect the higher sensitivity that has been observed in beaked whales and migrating mysticete whales (Table B-27). At the moment, this step function provides additional insight to calculating level B takes for certain species groups. The M-weighting functions, described by Southall et al. (2007) and used for the Wood et al. (2012) probabilistic disturbance step thresholds, are different from the weighting functions by Finneran (2016), previously mentioned. The M-weighting was specifically developed for interpreting the likelihood of audibility, whereas the Finneran weighting functions were developed to predict the likelihood of auditory injury.

The COP (Appendix III-M; Epsilon 2023) 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 2023). 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-27).

Table B-27: Behavioral Exposure Criteria

Marine Mammal Group	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)
	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 2023

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); 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 SEL-based PTS thresholds from Table B-26, but Level B exposures were estimated using SEL-based TTS thresholds as shown in Table B-28 because these are applicable for single detonation events that are proposed for Alternative B. 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-29) following the methodology of Hannay and Zykov (2022).

Table B-28: Temporary Threshold Shift Onset Acoustic Threshold Levels for Assessing Behavioral Disturbances from a Single Unexploded Ordnance Detonation

Hearing Group	TTS Onset Thresholds for Behavioral Disturbances (SEL_{24h})
LFC	168 dB re 1 µPa^2s
MFC	170 dB re 1 µPa^2s
HFC	140 dB re 1 µPa^2s
PPW	170 dB re 1 µPa^2s

Sources: JASCO 2023; NMFS 2018b

µPa^2s = 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-29: 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 2023; 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 2023). The 0 dB level was modeled as a reference point to evaluate the effectiveness of the sound reduction technology capable of reducing the produced pressures by at least 10 dB as proposed under Alternative B. 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.5.5 Marine Mammal Sound Exposure Estimates under the Proposed Action

As discussed in EIS Section 3.7, marine mammals occur in the RI/MA Lease Areas. Noise from proposed Project-related impact pile driving, vibratory setting, drilling, potential detonations of UXO, and HRG surveys has the potential to cause auditory impacts (i.e., 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 2023) and the applicant's LOA application (JASCO 2023) modeled sound propagation for each activity.

The Project includes two potential construction schedules, which incorporate the maximum Project design envelope and allows for some flexibility in the final construction plan. The first construction schedule (Construction Schedule A) assumes a 2-year construction scenario where 54 Phase 1 WTGs are installed on monopiles, 53 Phase 2 WTGs are installed on monopiles, 23 Phase 2 WTGs are installed on jackets, and 2 ESPs are installed on jackets (one during each phase). Construction Schedule A assumes that foundations for all of Phase 1 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 assumes a 3-year construction scenario where 55 Phase 1 WTGs are installed on monopiles, 75 Phase 2 WTGs are installed on jackets, and 2 ESPs are installed on jackets (one during each phase). Construction Schedule B assumes that all ESP foundations and Phase 1 12-meter monopile WTG foundations are installed in Year 1 and that the Phase 2 jacket WTG foundations are installed in Years 2 and 3. However, under both construction schedules, two positions may potentially have co-located ESPs (i.e., two foundations installed at one grid position), resulting in 132 foundations, so although Table B-30 includes 133 foundations installed in this schedule, only 132 would be installed under the Proposed Action (JASCO 2023).

Construction Schedule B has the longest duration (3 years) and the greatest number of piling days. Therefore, Construction Schedule B is carried forward in the effects analysis for the Proposed Action. A summary of the number of piling days under Construction Schedule B is provided in Table B-30.

Table B-30: Maximum Monthly Pile-Driving Days, Construction Schedule B (All Years Summed)[a]

Month	Total Days of Impact Pile Driving	Total Days with Vibratory Setting Followed by Impact Pile Driving[b]	Total Days with Drilling[c]	Total Days of Foundation Installation
May	6	0	4	6
June	17	6	10	23
July	15	11	9	26
August	10	16	9	26
September	7	10	9	17
October	0	8	4	8
November	2	3	3	5
December	2	0	0	2
Total	59	54	48	113
Total days	113 days			
Total foundations	133 foundations			
Total piles	367 piles			

Source: JASCO 2023

[a] This schedule covers the 5-year period 2025–2029, during which pile installation is scheduled to begin in 2026. These dates reflect the currently projected construction start year and are subject to change because exact start dates and construction schedules are not currently available. No concurrent/simultaneous pile driving of foundations is planned.

[b] The number of days with vibratory pile setting is based on a percentage of the number of days of pile installation and includes installation of a mix of monopiles at a rate of both one per day and two per day, as well as installation of jacket foundations at a rate of four pin piles per day.

[c] As a conservative measure, it was assumed that vibratory pile setting and drilling would not occur on the same day, when possible. However, for months when the number of days with vibratory pile setting plus the number of days with drilling exceeded the total number of impact piling days that month, the minimum number of days of overlap possible for these two activities was assumed.

For each pile type, the modeling included a piling schedule that accounted for soft-start procedures (Tables B-31 through B-33), as well as noise attenuation of at least 10 decibels (dB). Noise attenuation may be achieved with a variety of systems such as HydroSound Damper, bubble curtains, IHC Hydrohammer noise mitigation systems, or similar. For this analysis, BOEM identified 10 dB as the most appropriate because the type and manufacturer of a sound attenuation system has not yet been identified (Bellmann et al. 2020).

Table B-31: Soft-Start Procedure for Each Modeled Foundation Under the Proposed Action Installed using Only Impact Pile Driving

12-Meter Monopile, 5,000 kJ Hammer			13-Meter Monopile, 5,000 kJ Hammer			12-Meter Monopile, 6,000 kJ Hammer			4-Meter Pin Pile, 3,500 kJ Hammer			13-Meter Monopile, 6,000 kJ Hammer[a]		
Energy Level (kJ)	Strike Count	Pile Penetration (%)	Energy Level (kJ)	Strike Count	Pile Penetration (%)	Energy Level (kJ)	Strike Count	Pile Penetration (%)	Energy Level (kJ)	Strike Count	Pile Penetration (%)	Energy Level (kJ)	Strike Count	Pile Penetration (%)
1,000	690	25	1,000	745	25	1,000	750	25	525	875	25	1,000	850	25
1,000	1,930	25	1,000	2,095	25	2,000	1,250	25	525	1,925	25	2,000	1,375	25
2,000	1,910	20	2,000	2,100	20	3,000	1,000	20	1,000	2,165	14	3,000	1,100	20
3,000	1,502	20	3,000	1,475	20	4,500	1,000	20	3,500	3,445	26	4,500	1,100	20
5,000	398	10	5,000	555	10	6,000	500	10	3,500	1,395	10	6,000	550	10
Total	6,430	100	Total	6,970	100	Total	4,500	100	Total	9,805	100	Total	4,975	100
Strike rate	30.0 blows per minute		Strike rate	30.0 blows per minute		Strike rate	25.0 blows per minute		Strike rate	30.0 blows per minute		Strike rate	27.6 blows per minute	

Source: COP Appendix III-M; Epsilon 2023
kJ = kilojoule
[a] Although the Proposed Action may install the 13-meter monopile foundations at a maximum of 6,000 kJ, this is not modeled beyond acoustic source modeling in JASCO (2023) and is not considered in the proposed construction schedule.

Table B-32: Soft-Start Procedure for Monopile Foundations Under the Proposed Action Installed using Vibratory Pile Setting Followed by Impact Pile Driving

12-Meter Monopile			13-Meter Monopile			12-Meter Monopile			13-Meter Monopile			All Monopiles
Vibratory Hammer	5,000 kJ Impact Hammer		Vibratory Hammer	5,000 kJ Impact Hammer		Vibratory Hammer	6,000 kJ Impact Hammer		Vibratory Hammer	6,000 kJ Impact Hammer		
Duration (minute)	Energy Level (kJ)	Strike Count	Duration (minute)	Energy Level (kJ)	Strike Count	Duration (minute)	Energy Level (kJ)	Strike Count	Duration (minute)	Energy Level (kJ)	Strike Count	Pile Penetration (%)
60	—	—	60	—	—	60	—	—	60	—	—	25
—	1,000	1,930	—	1,000	2,095	—	2,000	1,250	—	2,000	1,375	25
—	2,000	1,910	—	2,000	2,100	—	3,000	1,000	—	3,000	1,100	20
—	3,000	1,502	—	3,000	1,475	—	4,500	1,000	—	4,500	1,100	20
—	5,000	398	—	5,000	555	—	6,000	500	—	6,000	550	10
—	Total	5,740	—	Total	6,225	—	Total	3,750	—	Total	4,125	100
Frequency: 20 Hz	Strike rate: 30.0 blows per minute		Frequency: 20 Hz	Strike rate: 30.0 blows per minute		Frequency: 20 Hz	Strike rate: 30.0 blows per minute		Frequency: 20 Hz	Strike rate: 30.0 blows per minute		—

Source: COP Appendix III-M; Epsilon 2023
Hz = hertz; kJ = kilojoule

Table B-33: Soft-Start Procedure for Jacket Foundations Under the Proposed Action Installed using Vibratory Pile Setting Followed by Impact Pile Driving

4-Meter Pin Pile			
Vibratory Hammer	3,500 kJ Impact Hammer		
Duration (minute)	Energy Level (kJ)	Strike Count	Pile Penetration (%)
60	—	—	25
—	525	1,925	25
—	1,000	2,165	14
—	3,500	3,445	26
—	3,500	1,395	10
—	Total	8,930	100
Frequency: 20 Hz	Strike rate: 30.0 blows per minute		

Source: COP Appendix III-M; Epsilon 2023
Hz = Hertz; kJ = kilojoule

The proposed Project also includes potential detonations of UXO. Initial geophysical survey results suggest there is a moderate risk of encountering UXOs within the SWDA and OECC. The preferred approach if UXOs are encountered is avoidance in which the WTG and ESP foundations and associated cables would be relocated to avoid the UXOs. There may be instances where avoidance of the UXOs are not feasible, so in-situ detonation would be required to continue construction activities such as foundation installation and cable-laying activities. The selection of the disposal method would be determined by the size, location, and condition of each individual UXO that the proposed Project may encounter (JASCO 2023). If detonation of UXOs is necessary, detonation noise has the potential to cause non-auditory injuries, potential mortal injuries, PTS or TTS in marine mammals, sea turtles, and marine fish. Therefore, this activity is assessed in the EIS. It is currently assumed up to 10 UXOs may require in-situ detonation over 2 years of construction (i.e., 6 in Year 1 and 4 in Year 2).

To estimate marine mammal densities (animals per square kilometer) for the modeling, JASCO (2023) used the most recent models available for each species from the Duke University Marine Geospatial Ecological Laboratory (Roberts et al. 2022). This is considered the best available information to be used for modeling in this assessment. The mean density for each month was calculated using the mean of all (5 × 5 kilometers [3.1 × 3.1 miles]) grid cells partially or fully within a 10-kilometer (6-mile) buffer around the SWDA for vibratory pile setting followed by impact pile driving and impact pile driving only; these were determined based on the longest 95th percentile exposure-based range ($ER_{95\%}$) estimated by JASCO (2023) for impact pile driving only and the smallest acoustic range from the COP (Appendix III-M; Epsilon 2023). Density values from the data are given in units of animals per 100 square kilometers (km^2; 38.6 square miles). The mean density between May to December were also calculated to coincide with planned impact pile-driving activities. Table B-34 provides the mean monthly and May to December averages for marine mammals included in the modeling. Blue whale densities from Roberts et al. (2022) were not applied to the modeling as they are considered a rare species within the proposed Project area (JASCO 2023).

Table B-34: Mean Density Estimates for Marine Mammal Species Modeled in a 10-Kilometer (6-Mile) Perimeter[a] around the Southern Wind Development Area for all Months

Common Name (Scientific Name)	Monthly Density (animals per 100 km²)												
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	May to December Mean[b]
Fin whale (*Balaenoptera physalus*)	0.215	0.166	0.107	0.164	0.272	0.256	0.438	0.366	0.227	0.057	0.051	0.141	0.226
Minke whale (*Balaenoptera acutorostrata*)	0.113	0.137	0.136	0.806	1.728	1.637	0.700	0.471	0.516	0.465	0.052	0.077	0.706
Humpback whale (*Megaptera novaeangliae)*	0.031	0.023	0.043	0.149	0.294	0.307	0.172	0.120	0.167	0.236	0.190	0.030	0.189
NARW (*Eubalaena glacialis*)	0.387	0.461	0.456	0.478	0.295	0.050	0.022	0.018	0.028	0.052	0.068	0.197	0.091
Sei whale *(Balaenoptera borealis*)	0.039	0.021	0.044	0.112	0.192	0.052	0.013	0.011	0.019	0.036	0.079	0.065	0.058
Sperm whale (*Physeter macrocephalus*)	0.031	0.011	0.013	0.003	0.014	0.028	0.038	0.107	0.070	0.057	0.031	0.020	0.046
Atlantic white-sided dolphin (*Lagenorhynchus acutus)*	2.049	1.230	0.850	1.313	3.322	3.003	1.392	0.730	1.654	2.431	1.791	2.440	2.095
Atlantic spotted dolphin (*Stenella frontalis)*	0.001	<0.001	<0.001	0.003	0.018	0.025	0.031	0.054	0.273	0.431	0.179	0.018	0.128
Short-beaked common dolphin (*Delphinus delphis)*	7.130	2.455	1.884	3.258	6.254	13.905	10.533	14.446	25.703	22.676	11.103	10.774	14.424
Common bottlenose dolphin (*Tursiops truncates)*	0.495	0.111	0.059	0.156	0.814	1.358	1.479	1.659	1.483	1.337	1.255	1.101	1.311
Risso's dolphin (*Grampus griseus)*	0.043	0.004	0.002	0.018	0.096	0.048	0.068	0.128	0.158	0.087	0.120	0.179	0.111
Long-finned pilot whale (*Globicephala melas)*	0.189	0.189	0.189	0.189	0.189	0.189	0.189	0.189	0.189	0.189	0.189	0.189	0.189
Short-finned pilot whale (*Globicephala macrorhynchus)*	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047
Harbor porpoise (*Phocoena phocoena)*	10.007	10.784	10.277	8.914	6.741	0.960	0.880	0.848	0.988	1.271	1.418	5.812	2.365
Gray seal (*Halichoerus grypus)*	5.395	5.603	4.176	3.203	4.716	0.806	0.088	0.094	0.226	0.500	1.768	4.534	1.591
Harbor seal (*Phoca vitulina)*	8.093	8.404	6.265	4.804	7.074	1.209	0.132	0.140	0.339	0.750	2.652	6.802	2.387
Harp seal (*Pagophilus groenlandicus)*	5.781	6.003	4.475	3.432	5.053	0.864	0.094	0.100	0.242	0.535	1.894	4.858	1.705

Source: JASCO 2023

km² = square kilometer; SWDA = Southern Wind Development Area

[a] The perimeter around the SWDA was determined based on the longest exposure range to the thresholds for vibratory pile setting from the modeling (JASCO 2023).

[b] Pile-driving activities would only occur from May to December.

The following subsections summarize the results of the animal exposure modeling conducted for the Project's Incidental Take Regulation application (JASCO 2023) and COP (Appendix III-M; Epsilon 2023), which incorporate the schedules and densities provided above.

B.5.5.1 Noise Exposure from Foundation Installation Activities

The WTG and ESP foundations would be installed using a combination of vibratory pile setting and impact pile driving. Sixty-three of the 132 foundations, which includes all pile types (i.e., 12-meter monopile, 13-meter monopile, and 4-meter pin pile for the jacket foundations), would be installed using impact pile driving; the remaining foundations would be installed first using vibratory pile setting followed by impact pile driving. The applicant has determined it may be necessary to start pile installation using a vibratory hammer rather than using an impact hammer, a technique known as vibratory setting of piles. The vibratory method is particularly useful when seabed sediments are not sufficiently stiff to support the weight of the pile during the initial installation, increasing the risk of 'pile run' where a pile sinks rapidly through seabed sediments. A seabed drivability analysis conducted by the applicant estimated the number of foundation positions that could potentially require vibratory setting of piles. The analysis suggested that up to 50 percent of foundations (approximately 66 foundations) could require vibratory setting. An additional 6 percent conservatism is assumed (6 percent of 66 is approximately 4 additional foundations), resulting in approximately 70 total foundations (53 percent of all proposed foundations) that may require vibratory setting (JASCO 2023; COP Appendix III-M; Epsilon 2023).

The piling soft-start schedule for impact pile driving only and vibratory pile setting followed by impact pile driving are provided in Tables B-31 through B-33 for all foundation types. These piling schedules were used in the acoustic propagation and exposure modeling to estimate the threshold ranges and exposure estimates. The piling schedules determine the overall duration of piling activities for each foundation. For consecutive piles, a delay in the pile schedule is included between foundation installation event; for foundations requiring vibratory pile setting, 15 minutes were also included in between the vibratory and impact hammering to account for the time needed to switch equipment (JASCO 2023; COP Appendix III-M; Epsilon 2023).

The JASCO Applied Sciences Animal Simulation Model Including Noise Exposure (JASMINE) was used to predict the probability of exposure of animals to sound above thresholds arising from the proposed Project's impact pile-driving activities. Sound exposure models like JASMINE use simulated animals (animats) to sample the predicted 3D sound fields with movement rules derived from animal observations (JASCO 2023). Modeled sound fields are generated from representative pile locations, and animats are programmed to behave like the marine animals that may be present in the proposed Project area. The parameters used for forecasting realistic behaviors (e.g., diving, foraging, aversion, surface times) are determined and interpreted from marine species studies (e.g., tagging studies), where available or reasonably extrapolated from related species as referenced in the model (JASCO 2023; COP Appendix III-M; Epsilon 2023).

The acoustic modeling to SEL thresholds, without considering animal movement, produces the 95th percentile acoustic ranges at which a marine mammal would have to remain stationary for the entire duration of the activity to be exposed to levels above the stated threshold. To provide a realistic estimate of distances at which acoustic thresholds for marine mammals may be met, the COP (Appendix III-M; Epsilon 2023) modeled exposure ranges to PTS and behavioral thresholds for impulsive sources. To determine exposure ranges, pile strikes are propagated to create an ensonified environment while simulated animals (i.e., animats) are moved about the ensonified area following expected 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. The exposure-based ranges represent the range over which 95 percent of the closest points of approaches for animats that exceeded the threshold (i.e., $ER_{95\%}$). The potential for noise from vibratory pile setting to induce PTS is low relative to impact pile driving; however, due to the relatively short (15-minute) period between vibratory and impact piling for each foundation, vibratory setting and impact pile driving must be considered together as part of the total received acoustic energy for the entire pile installation (JASCO 2023; COP Appendix III-M; Epsilon 2023).

The Project design envelope described in EIS Section 2.1.2, Alternative B – Proposed Action, includes installation of both one and two monopile foundations installed per day. However, the modeled $ER_{95\%}$ with 10 dB noise attenuation for all pile types installed using impact pile driving only summarized in Table 3.7-9 and piles installed using vibratory pile setting followed by impact pile driving summarized in Table 3.7-10 in EIS Section 3.7 represent the results for only installation of up to two monopiles per day, as these were the largest ranges for these foundation types, which enabled a conservative assessment of impacts in the EIS. As discussed further in this section, the exposure estimates account for the full construction schedule in Table B-30, which accounts for both scenarios (i.e., days where one pile is driven and days where two piles are driven). All pin piles would be installed at a rate of four piles per day.

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 2023) and LOA application (JASCO 2023) included sources such as the 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 meter) may improve the attenuation levels up to 11 to 13 dB (JASCO 2023). 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 Hydrohammer 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 2023), while Hydro Sound Dampers were measured at 10 to 12 dB attenuation and are independent of depth (Bellmann et al. 2020). Systems may be deployed in series to achieve higher levels of attenuation).

Based on the best available information (Bellmann et al. 2020; Caltrans 2015; JASCO 2023), it is reasonable to assume the applicant may achieve up to 12 dB noise attenuation due to implementation of noise attenuation during foundation installation activities. 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).

Modeled $ER_{95\%}$ to Level B harassment with 10 dB attenuation during impact pile driving is lower for jacket piles (2.5 to 3.0 miles depending on the hearing group) compared to the monopiles (2.6 to 3.4 miles depending on the hearing group) for all marine mammals (Tables 3.7-9 and 3.7-10 in EIS Section 3.7) (COP Appendix III-M; Epsilon 2023). Even with a minimum of 10 dB attenuation, Level B harassment to marine mammals during foundation installation activities are likely to occur 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 were the largest for low-frequency cetaceans (LFC) (mysticetes) (Tables 3.7-9 and 3.7-10 in EIS Section 3.7). The isopleths for Level A harassment during foundation installation with 10 dB noise attenuation for NARW, fin whale, sei whale, humpback whales (*Megaptera novaeangliae*), and minke whales (*Balaenoptera acutorostrata*) averaged 1.6 miles for jacket foundations (pin piles) and 1.1 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).

Modeled $ER_{95\%}$ to thresholds for Level A harassment during foundation installation were a maximum of 2,592 feet for seals (pinnipeds in water hearing group) and 755 feet for harbor porpoise (*Phocoena phocoena*; high-frequency cetacean [HFC] hearing group) and 0 feet for small for dolphins, pilot whales, and sperm whales (mid-frequency cetacean [MFC] hearing group) (Tables 3.7-9 and 3.7-10 in EIS Section 3.7).

Table B-35 summarizes the numbers of marine mammals estimated to experience sound levels above threshold criteria for Level A and B harassment for the construction schedule in Table B-30 with 10 dB noise attenuation during impact pile driving (JASCO 2023). The exposure estimates incorporate a construction schedule that includes a combination of foundations installed with vibratory setting of piles followed by impact pile driving and foundations installed with impact pile driving alone for all foundation types (JASCO 2023).

Table B-35: Number of Animals Exposed to Noise at or Above Thresholds for All Foundation Types[a] over All 3 Years of Construction under the Proposed Action with 10 Decibel Noise Attenuation

Species	Level A Harassment	Level B Harassment
Fin whale (*Balaenoptera physalus*)[b]	33	349
Humpback whale (*Megaptera novaeangliae*)	29	247
Minke whale (*Balaenoptera acutorostrata*)	140	1,009
NARW (*Eubalaena glacialis*)[b]	0[c]	74
Sei whale (*Balaenoptera borealis*)[b]	6	50
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	0	3,427
Atlantic spotted dolphin (*Stenella frontalis*)	0	227
Common bottlenose dolphin (*Tursiops truncatus*)	0	3,622
Long-finned pilot whale (*Globicephala melas*)	0	3,622
Short-finned pilot whale (*Globicephala macrorhynchus*)	0	370
Risso's dolphin (*Grampus griseus*)	0	698
Common dolphin (*Delphinus delphis)*	0	48,808
Sperm whale (*Physeter macrocephalus*)[b]	0	97
Harbor porpoise (*Phocoena phocoena*)	18	1,594
Gray seal (*Halichoerus grypus*)	3	2,036
Harbor seal (*Phoca vitulina*)	3	1,072
Harp seal (*Pagophilus groenlandicus*)	3	2,841

Source: JASCO 2023

NARW = North Atlantic right whale
[a] The exposure estimates in this table include all foundations under the Proposed Action as a combination of foundations installed with vibratory setting of piles followed by impact pile driving and foundations installed with impact pile driving alone using the construction schedule in Table 1-3 of the BA (BOEM 2023a).
[b] This is an ESA-listed species.
[c] Five PTS exposures were estimated for NARW, but due to mitigation measures proposed, no PTS (Level A takes) exposures are expected, and no Level A takes have been requested for this species. PTS and behavioral exposures are based on the number of Level A and Level B takes requested in the draft Incidental Take Authorization (ITA) application addendum (JASCO 2023).

B.5.5.2 Noise Exposure from Foundation Drilling

Exposures for foundation 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 2023). 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 23,143 feet for all marine mammals during foundation drilling. For the exposure assessment, JASCO (2023) assumed 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. This equates to a total of 48 foundations requiring drilling, which are included in the construction schedule shown in Table B-30. The exposure estimates in Table B-36 represent the total exposures for all years of construction based on the higher of the take estimates from either Schedule A or Schedule B for each species, as this is what was used for the final take request in the proposed Project's Incidental Take Regulation (JASCO 2023).

Table B-36: Estimated Number of Marine Mammals Exposed above Level B Harassment Thresholds during Drilling of Foundations (All Years Combined)

Species	Maximum Level B Harassment
Fin whale (*Balaenoptera physalus*)[a]	30
Humpback whale (*Megaptera novaeangliae*)	22
Minke whale (*Balaenoptera acutorostrata*)	78
NARW (*Eubalaena glacialis*)[a]	6
Sei whale (*Balaenoptera borealis*)[a]	5
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	182
Atlantic spotted dolphin (*Stenella frontalis*)	14
Common bottlenose dolphin (*Tursiops truncatus*)	143
Long-finned pilot whale (*Globicephala melas*)	20
Short-finned pilot whale (*Globicephala macrorhynchus*)	6
Risso's dolphin (*Grampus griseus*)	12
Common dolphin (*Delphinus delphis*)	1,575
Sperm whale (*Physeter macrocephalus*)[a]	7
Harbor porpoise (*Phocoena phocoena*)	137
Gray seal (*Halichoerus grypus*)	69
Harbor seal (*Phoca vitulina*)	103
Harp seal (*Pagophilus groenlandicus*)	74

Source: JASCO 2023

NARW = North Atlantic right whale
[a] This is an ESA-listed species.

B.5.5.3 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 2023). 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 (JASCO 2023). These activities could potentially expose animals to Level A and Level B TTS. The radial distances to the SEL-based criteria and Lpk ranges for PTS and TTS for UXO detonations with 10 dB attenuation are provided in the LOA application (JASCO 2023). 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 (JASCO 2023) 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 2023). 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 and the proposed schedule provided in Section B.4.5, Sound Source Calculation, to calculate total estimated exposures in Table B-37.

Table B-37: Maximum Estimated Marine Mammal Exposures 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]	2	14
Humpback whale (*Megaptera novaeangliae*)	2	10
Minke whale (*Balaenoptera acutorostrata*)	7	55
NARW (*Eubalaena glacialis*)[b]	0[c]	27
Sei whale (Balaenoptera borealis)[b]	2	7
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	2	6
Atlantic spotted dolphin (*Stenella frontalis*)	2	2
Common bottlenose dolphin (*Tursiops truncatus*)	2	4
Long-finned pilot whale (*Globicephala melas*)	2	2
Short-finned pilot whale (*Globicephala macrorhynchus*)	2	2
Risso's dolphin (*Grampus griseus*)	2	2
Common dolphin (*Delphinus delphis*)	2	38
Sperm whale (*Physeter macrocephalus*)[b]	2	2
Harbor porpoise (*Phocoena phocoena*)	107	410
Gray seal (*Halichoerus grypus*)	12	226
Harbor seal (*Phoca vitulina*)	25	507
Harp seal (*Pagophilus groenlandicus*)	12	226

Source: JASCO 2023

NARW = North Atlantic right whale; 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 over 2 years with 10 dB noise attenuation.
[b] This is an ESA-listed species.
[c] Two PTS exposure were estimated for NARW, but due to mitigation measures proposed by the applicant, no PTS (Level A takes) exposures are expected, and no Level A takes have been requested for these species. PTS and behavioral exposures are based on the number of Level A and Level B takes requested in the draft ITA application addendum (JASCO 2023).

B.5.5.4 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 2023). No Level A exposures are expected to occur during HRG surveys from either type of equipment. It was assumed that HRG surveys would be conducted for 24 hours per day for up to 25 days each year (totaling 125 days over the 5-year ITA period) beginning in the first year of foundation installation and extending 2 years beyond the 3-year foundation installation schedule (JASCO 2023). JASCO conducted acoustic modeling for the HRG survey equipment proposed for the Project, and the Level B exposure estimates are provided in Table B-38.

Table B-38: Estimated Marine Mammal Exposures 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]	3.11	2.47
Humpback whale (*Megaptera novaeangliae*)	2.31	1.83
Minke whale (*Balaenoptera acutorostrata*)	12.17	9.64
NARW (*Eubalaena glacialis*)[a]	4.05	3.21
Sei whale (*Balaenoptera borealis*)[a]	1.38	1.09
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	24.34	19.26
Atlantic spotted dolphin (*Stenella frontalis*)	2.88	2.28
Common bottlenose dolphin (*Tursiops truncatus*)	12.53	9.92
Long-finned pilot whale (*Globicephala melas*)	1.06	0.84
Short-finned pilot whale (*Globicephala macrorhynchus*)	0.78	0.62
Risso's dolphin (*Grampus griseus*)	1.34	1.06
Common dolphin (*Delphinus delphis*)	202.3	160.13
Sperm whale (*Physeter macrocephalus*)[a]	0.79	0.62
Harbor porpoise (*Phocoena phocoena*)	78.41	62.07
Gray seal (*Halichoerus grypus*)	199.35	157.8
Harbor seal (*Phoca vitulina*)	447.89	354.54
Harp seal (*Pagophilus groenlandicus*)	199.35	157.8

Source: JASCO 2023

NARW = North Atlantic right whale
[a] This is an ESA-listed species.

B.5.5.5 Incidental Take Requested

For the proposed Project, the calculated exposure numbers in Tables B-35 through B-38 differ from the total number of takes requested in the LOA application (JASCO 2023). The requested numbers shown in Table B-39 were adjusted from the calculated exposures using the following assumptions, summarized from JASCO 2023:

- For impact pile driving, the greater of the two Level A exposure estimates (SEL_{24h} or 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 (Appendix H).
- For the total requested take for foundation installation, 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 group size data (88 Fed. Reg. 37606 [June 8, 2023]).
- The total requested take used the construction schedule that resulted in the greatest number of estimated Level B exposures during foundation installation 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 and 2021 (JASCO 2023).
- The blue whale was not modeled with the other species by JASCO (2023) because they are considered rare in the proposed Project area; instead, they were included based on the estimated group size. To allow for maximum flexibility and uncertainty in construction schedules, a 3-year construction schedule was assumed for potential exposures of rare species, assuming one group of each rare species could be exposed above Level A and B thresholds in any 2 years of the 3-year construction schedule.

Table B-39: Total Requested Incidental Take for All Activities for the 5-Year Effective Period of the Incidental Take Regulation

Species	Takes by Level A Harassment	Takes by Level B Harassment
Fin whale (*Balaenoptera physalus*)	36	403
Humpback whale (*Megaptera novaeangliae*)	33	282
Minke whale (*Balaenoptera acutorostrata*)	148	1,058
NARW (*Eubalaena glacialis*)	0	132
Sei whale (*Balaenoptera borealis*)	8	67
Blue whale (*Balaenoptera musculus*)	2	113
Sperm whale (*Physeter macrocephalus*)	2	3,465
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	2	3,465
Atlantic spotted dolphin (*Stenella frontalis*)	2	419
Common bottlenose dolphin (*Tursiops truncatus*)	2	3,747
Long-finned pilot whale (*Globicephala melas*)	2	461
Short-finned pilot whale (*Globicephala macrorhynchus*)	2	79
Risso's dolphin (*Grampus griseus*)	2	790
Common dolphin (*Delphinus delphis*)	2	49,502
Harbor porpoise (*Phocoena phocoena*)	125	2,426
Gray seal (*Halichoerus grypus*)	15	3,586
Harbor seal *(Phoca vitulina*)	28	3,895
Harp seal (*Pagophilus groenlandicus*)	15	4,395

Source: JASCO 2023

NARW = North Atlantic right whale

The applicant's self-imposed mitigation measures, including use of soft-start procedures, protected species observers, and PAM would reduce the risk of threshold-level exposures to marine mammals. BOEM could further reduce potential impacts on marine mammals by implementing additional mitigation and monitoring measures outlined in EIS Appendix H, which could include long-term PAM; daily, pre-construction PAM and visual surveys; a sunrise and sunset prohibition on pile driving; and requiring the use of noise reduction technologies during all pile-driving activities to achieve a 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 2023; JASCO 2023). 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.5.5.6 Summary

As described above, the applicant modeled the potential for marine mammal to be exposed to proposed 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-40 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 2023).

Table B-40: Take of Endangered Species Act-listed Marine Mammals due to Exposure to All Potential Noise-Producing Proposed Project Activities[a]

Species	TTS/Behavioral Response	Auditory Injury (PTS)
NARW (*Eubalaena galcialis*)	132	0
Fin whale (*Balaenoptera physalus*)	403	36
Sperm whale (*Physeter macrosephalus*)	113	2
Sei whale (*Balaenoptera borealis*)	67	9
Blue whale (*Balaenoptera musculus*)	4	2

Source: JASCO 2023

dB = decibel; PTS = permanent threshold shift; NARW = North Atlantic right whale; TTS = temporary threshold shift; UXO = unexploded ordnance

[a] 10 dB broadband noise attenuation was applied to the take calculations for impact pile driving and potential UXO detonations.

B.6 Sea Turtle Sound Exposure Estimates

As discussed in EIS Section 3.8, sea turtles occur seasonally within the RI/MA Lease Areas. Underwater noise generated by impact pile driving during installation of WTG and ESP foundations; vibratory pile setting during installation of WTG and ESP foundations; foundation drilling during installation of the WTG and ESP foundations; potential UXO detonations; HRG surveys; vessel activity; and WTG operation would increase sound levels in the marine receiving environment and may result in potential adverse impacts on sea turtles in the proposed Project area including PTS and behavioral disturbances. Exposure modeling was conducted for up to 132 foundations using 12-meter (39-foot) monopiles, 13-meter (42-foot) monopiles, and 4-meter (13-foot) pin piles. Sea turtle sound exposure estimates were only modeled for impact pile driving (Appendix III-M; Epsilon 2023); therefore, potential impacts from the remaining sound sources are based on the qualitative assessment of underwater noise provided in EIS Section 3.8.

In general, sea turtle auditory perception is thought to occur through a combination of both bone and water conduction rather than air conduction (Lenhardt and Harkins 1983; Lenhardt et al. 1985). The outermost part of the sea turtle ear, or tympanum, is covered by a thick layer of skin covering a fatty layer that conducts sound in water to the middle and inner ear. This is a distinguishing feature from terrestrial and semi-aquatic turtles. This thick outer layer makes it difficult for turtles to hear well in air, but it facilitates the transfer of sound from the aqueous environment into the ear (Ketten et al. 1999). The middle ear has two components that are encased by bone, the columella and extracolumella, which provide the pathway for sound from the tympanum on the surface of the turtle head to the inner ear consisting of the cochlea and basilar membrane. This arrangement enables sea turtles to hear low-frequency sounds while underwater. The middle ear is also connected to the throat by the Eustachian tube. Because there is air in the middle ear, it is generally believed that sea turtles detect sound pressure rather than particle motion. Vibrations can also be conducted through the bones of the carapace to reach the middle ear. Based on studies of semi-aquatic turtles, Christensen-Dalsgaard et al. (2012) speculated that the sea turtle ear may not be specialized for bone conduction, but rather that sound-induced pulsations may drive the tympanic disc if the middle ear cavity is air-filled. A detailed description of sea turtle auditory anatomy and different hearing capabilities of each species are available in Reese et al. (2023).

Hearing in sea turtles has been measured through electrophysiological and/or behavioral studies both in air and water on a limited number of life stages for each of the five species. In general, sea turtles hear best in water between 100 to 750 Hz, do not hear well above 1 kHz, and are generally less sensitive to sound than marine mammals (Reese et al. 2023; Papale et al. 2020). While there are still substantial data gaps on hearing sensitivity across species and throughout ontogeny, there is data on loggerhead hearing capabilities at the post-hatchling (Lavender et al. 2012; 2014), juvenile (Bartol et al. 1999; Lavender et al. 2012, 2014b), and adult stages (Martin et al. 2012). The primary data available on sea turtle hearing abilities are summarized in Table B-41.

Table B-41: Hearing Capabilities of Sea Turtles

Sea Turtle Species	Hearing		
	Range (Hz)	**Highest Sensitivity (Hz)**	**Source**
Green sea turtle (*Chelonia mydas*)	60–1,000	300–500	Ridgway et al. 1969
	100–800	600–700 (juveniles) 200–400 (subadults)	Bartol and Ketten 2006; Ketten and Bartol 2005
	50–1,600	50–400	Piniak et al. 2016
Loggerhead (*Caretta caretta*)	250–1,000	250	Bartol et al. 1999
	50–1,100	100–400	Martin et al. 2012; Lavender et al. 2014
Kemp's Ridley (*Lepidochelys kempii*)	100–500	100–200	Bartol and Ketten 2006; Ketten and Bartol 2005
Leatherback (*Dermochelys coriacea*)	50–1,200 (underwater)	100–400	Piniak et al. 2012

Hz = hertz

Table B-42 outlines the acoustic thresholds for the onset of PTS and behavioral disruptions for sea turtles for impulsive and non-impulsive noise sources. Also known as auditory fatigue, TTS is the milder form of hearing impairment that is non-permanent and reversible and results from exposure to high-intensity sounds for short durations or lower intensity sounds for longer durations. TTS thresholds, though not considered in this assessment, are available for sea turtles.

TTS is typically applied when assessing regulatory impacts of high-order detonations like military operations or explosions; however, as more research is done, TTS may play a bigger role in sea turtle impact assessment in the future. Until more studies improve the understanding of TTS in sea turtles, ranges to TTS thresholds and TTS exposures should be considered qualitative, and mitigation measures designed to reduce PTS exposures should also contribute to reducing the risk of the TTS exposures.

For behavioral thresholds, no distinction is made between impulsive and non-impulsive sources. Behavioral criteria were developed by the U.S. Navy in consultation with NMFS and were derived from measurements conducted during exposure to airgun noise presented in McCauley et al. 2000 and Finneran et al. 2017. The received SPL at which sea turtles have been observed exhibiting behavioral responses to airgun pulses, 175 dB re 1 μPa, is also expected to be the received sound level at which sea turtles would exhibit behavioral responses when exposed to impact pile driving (impulsive) and vibratory pile setting (non-impulsive) activities (Finneran et al. 2017).

Table B-42: Acoustic Thresholds for Onset of Acoustic Impacts (Permanent Threshold Shift, Temporary Threshold Shift, or Behavioral Disturbance) for Endangered Species Act-Listed Sea Turtles

Impulsive Sources					Non-Impulsive Sources	
PTS		TTS		Behavioral Disturbance	PTS	Behavioral Disturbance
Lpk	SEL_{24h}[a]	Lpk	SEL_{24h}[a]	SPL	SEL_{24h}[a]	SPL
232	204	226	189	175	220	175

Source: Finneran et al. 2017
Lpk = peak sound pressure level in units of decibels referenced to 1 micropascal; PTS = permanent threshold shift; SEL_{24h} = sound exposure level over 24 hours in units of decibels referenced to 1 micropascal squared second; SPL = root-mean-square sound pressure level in units of decibels referenced to 1 micropascal; TTS = temporary threshold shift
[a] SEL_{24h} thresholds include frequency weighting for sea turtles as described by Finneran et al. (2017).

NMFS has adopted criteria used by the U.S. Navy to assess the potential for non-auditory injury from underwater explosive sources as presented in Finneran et al. (2017). The criteria include thresholds for the following non-auditory impacts: mortality, lung injury, and gastrointestinal injury. Unlike auditory thresholds, these depend upon an animal's mass and depth. Table 3-43 provides mass estimates used in the assessment from Finneran et al. (2017). Table B-29 provides the equations used to estimate these thresholds based on animal mass and depth in the water column.

Single blast events within a 24-hour period are not presently considered by NMFS to produce behavioral impacts if they are below the onset of TTS thresholds for frequency-weighted SEL_{24h} and unweighted peak SPL in units of decibels referenced to 1 micropascal (Lpk). As only one charge detonation per day is planned for the proposed Project, the effective disturbance threshold for single events in each 24-hour period is the TTS onset (Table B-42).

Table B-43: Representative Mass Estimates Used for Assessing Impulse-based Onset of Lung Injury and Mortality Threshold Exceedance Distances

Species	Hatchling Mass (kilograms)	Adult Mass (kilograms)
Loggerhead sea turtle	8.7	70
Green sea turtle	8.7	110
Kemp's ridley sea turtle	6.25	32
Leatherback sea turtle	35.18	300

Source: Finneran et al. (2017)

As with marine mammals, the potential for underwater noise to result in adverse impacts on a sea turtle depends on the received sound level, the frequency content of the sound relative to the hearing ability of the animal, the duration of the exposure, and the context of the exposure. Potential impacts range from subtle changes in behavior at low received levels to strong disturbance impacts or PTS at high received levels. Auditory masking may also occur when sound signals used by sea turtles (e.g., predator vocalizations and environmental cues) overlap in time and frequency with another sound source (e.g., pile driving). Popper et al. (2014) determined that continuous noise produced at frequencies and sound levels detectable by sea turtles can mask signal detection. As with behavioral impacts, the consequences of masking to sea turtle fitness are unknown. The frequency range of best hearing sensitivity estimated for sea turtles is estimated at 100 to 1,000 Hz (Table B-41). Masking is, therefore, more likely to occur with sound sources that have dominant low frequency spectrums such as vessel activities, vibratory pile setting, and WTG operations. These sound sources are also considered continuous, meaning they are present within the water column for longer durations and, therefore, have a higher chance of affecting sea turtle auditory perception.

The COP (Appendix III-M; Epsilon 2023) includes acoustic modeling of underwater sound generated and potential impacts on sea turtle species during pile installation using the same methods as described previously in Section B.4.

For modeling used in this analysis and the COP (Appendix III-M; Epsilon 2023), sea turtle densities were obtained from the U.S. Navy Operating Area Density Estimate database on the Strategic Environmental Research and Development Program Spatial Decision Support System portal (U.S. Navy 2012, 2017) and the Northeast Large Pelagic Survey Collaborative Aerial and Acoustic Surveys for Large Whales and Sea Turtles (Kraus et al. 2016a). These data are summarized seasonally (winter, spring, summer, and fall). Because the results from Kraus et al. (2016a) use more recent data, those were used preferentially where possible. The COP (Appendix III-M; Epsilon 2023) notes that the winter densities of sea turtles in the SWDA were likely overestimated because these estimates are provided as a range of potential densities within each grid square, and the maximum density always exceeds zero. Thus, winter densities were reported, even though turtles are unlikely to be present in winter because the COP (Appendix III-M; Epsilon 2023) assumed maximum densities for all seasons. Details on data handling to develop these estimates are available in the COP (Appendix III-M; Epsilon 2023). These estimates suggest that leatherback sea turtles are the most likely species of sea turtle to be found in the proposed Project area followed by loggerhead sea turtles, and their densities would be highest during the summer and fall (Appendix III-M; Epsilon 2023).

Table B-44 shows the number of sea turtles estimated to be exposed to sound levels above potential PTS and behavioral disturbance threshold criteria during foundation installation activities, which include a combination of vibratory pile setting followed by impact pile driving and impact pile driving only, modeled in the COP (Appendix III-M; Epsilon 2023).

Table B-44: Number of Animals Exposed to Noise at or Above Thresholds for All Foundation Types[a] over All 3 Years of Construction under the Proposed Action with 10 Decibel Noise Attenuation

Common Name (Scientific Name)	PTS (Lpk)	PTS (SEL_{24h})	Behavior (SPL)
Kemp's ridley sea turtle (*Lepidochelys kempii)*	0	0.02	0.27
Leatherback sea turtle (*Dermochelys coriacea*)	0	4.17	5.40
Loggerhead sea turtle (*Caretta caretta*)	0	1.11	9.85
Green sea turtle (*Chelonia mydas*)	0	0.11	0.66

Source: COP Appendix III-M; Epsilon 2023
dB = decibel; Lpk. = peak sound pressure level in units of dB referenced to 1 micropascal; PTS = permanent threshold shift; SEL_{24h} = sound exposure level over 24 hours in units of dB referenced to 1 micropascal squared second; SPL = root-mean-square sound pressure level in units of dB referenced to 1 micropascal
[a] The exposure estimates include all foundations proposed for the Project as a combination of foundations installed with vibratory setting of piles followed by impact pile driving and foundations installed with impact pile driving alone.

B.7 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 marine mammal 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.7.1 North Atlantic Right Whales

The NARW is known to inhabit continental shelf and coastal waters in the northwest Atlantic, ranging from calving grounds in the southeastern United States to feeding grounds in New England waters and the Bay of Fundy, Scotian Shelf, and Gulf of St. Lawrence in Canadian waters (Hayes et al. 2023). There are two critical habitat areas for NARWs in U.S. waters: all U.S. waters within the Gulf of Maine are designated as a foraging area critical habitat, while waters off the southeastern United States are designated as a calving area critical habitat (81 Fed. Reg. 4837 [February 26, 2016]). The Mid-Atlantic OCS between the two critical habitat areas has been identified as a principal migratory corridor and, thus, an important habitat for NARWs as they travel between breeding and feeding grounds (Hayes et al. 2023; CETAP 1982). This migratory pathway is considered a biologically important area for the species (LaBrecque et al. 2015). While some individuals undergo yearly migrations between summer months at their northern feeding grounds and winter months at their southern breeding grounds, the location of most individuals throughout much of the year is poorly understood. Year-round presence in all habitat areas has been recorded, including off southern New England (O'Brien et al. 2022a). NARW distribution and patterns of habitat use has shifted both spatially and temporally beginning in 2010 (Davis et al. 2017), likely in response to shifting prey resources. Fewer individuals appear to the Great South Channel and Bay of Fundy, whereas larger numbers have been seen in Cape Cod Bay and the region south of Martha's Vineyard and Nantucket (Leiter et al. 2017; Stone et al. 2017).

The NARW is a large, relatively stock whale that can range in length from 55.8 to 59 feet. One of the most distinguishing features of the right whale is their prominently curved jawline and whitish callosities, or areas of roughened skin, covering the top of their rostrum and head, which can be up to one-third of their body length (Jefferson et al. 1993). The callosities form a unique pattern on the animal's head, enabling individual identification similar to a fingerprint and fundamental to demographic and movement studies. Foraging habits of NARWs show a clear preference for the zooplanktonic copepod, *Calanus finmarchicus* (Mayo et al. 2001). The NARW distribution and movement patterns within their foraging grounds is highly correlated with concentrations and distributions of their prey, which exhibit high variability within and between years (Pendleton et al. 2012). Due to the heightened energetic requirements of pregnant and nursing females, yearly reproductive success of the population is directly related to foraging success and the abundance of *C. finmarchicus* (Meyer-Gutbrod et al. 2015), which in turn is correlated with decadal-scale variability in climate and ocean patterns (Greene and Pershing 2000).

Skim feeding is an important activity identified in effects assessments because it demonstrates a critical behavior (feeding) that could be disrupted by introduced noise. Similarly, NARWs spend extended periods of time at the water's surface actively socializing in what are known as surface active groups; surface active groups have been documented in all habitat regions; during all seasons; involve all age classes; and include mating behaviors, play, and the maintenance of social bonds (Parks et al. 2007). The extensive and biologically critical surface behaviors of NARWs, such as surface skim feeding and surface-active groups, represent a vulnerable time for NARW as they are exposed to an increased risk for ship strike when active at or near the surface.

The NARW is listed as Endangered under the ESA and Critically Endangered by the International Union for Conservation of Nature (IUCN) Red List (Cooke 2020; Hayes et al. 2023). NARWs are considered to be one of the most critically endangered large whale species in the world (Hayes et al. 2023). The Western North Atlantic population size was estimated to be 338 individuals in the most recent NMFS stock assessment report, which used a hierarchical, state-space Bayesian open population model of sighting histories from the photo-identification recapture database through November 2022 (Hayes et al. 2023). Between 2011 and 2020, the population has declined in overall abundance by 29.7 percent, further evidenced by the decrease in the abundance estimate from 451 in 2018 to the current 2021 estimate of 338 individuals (Hayes et al. 2023). This decline in abundance follows a previous positive population trend from 1990 to 2011 that saw an increase of 2.8 percent per year from an initial abundance estimate of 270 individuals in 1998 (Hayes et al. 2023). Over time, there have been periodic swings of per capita birth rates (Hayes et al. 2023), although current birth rates continue to remain below expectations (Pettis et al. 2022), with an approximately 40 percent decline in reproductive output for the species since 2010 (Kraus et al. 2016b).

Researchers have identified 17 calves for the 2024 calving season as of February 1, 2024, though one of the calves was observed with severe injuries consistent with a vessel strike off Amelia Island, Florida, in January 2024. During the 2023 calving season (defined as calves born between mid-November 2022 and mid-April 2023), 12 calves were observed (down from 15 during the 2022 season and 20 during the 2021 season) (NMFS 2024a). 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 (Pettis et al. 2022; NMFS 2024a). 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).

Net productivity rates do not exist, as the western North Atlantic stock lacks any definitive population trend (Hayes et al. 2023). The average annual human-related mortality/injury rate exceeds that of the calculated potential biological removal (PBR) of 0.7, and due to its listing as Endangered under the ESA, this population is classified as strategic and depleted under the Marine Mammals Protection Act (Hayes et al. 2023). Estimated human-caused mortality and serious injury between 2016 and 2020 was 8.1 whales per year, of which 5.7 whales per year are attributed to fisheries interactions and the remainder 2.4 whales per year caused by vessel strike (Hayes et al. 2023). However, it is likely that not all mortalities are documented, and modeling suggests that the mortality rate for the period from 2014 to 2018 may be up to 27.4 animals (Hayes et al. 2023; Pace 2021). There have been elevated numbers of mortalities reported since 2017, which prompted NMFS to designate an unusual mortality event (UME) for NARWs (NMFS 2024b). These elevated mortalities have continued into 2024, totaling 36 mortalities, 35 serious injuries, and 51 sublethal injuries or illness (NMFS 2024b). Based on the mortalities for which the carcasses could be examined, preliminary analyses indicate that most of the reported mortalities are likely to be human caused, predominantly from entanglement in fishing gear or vessel collisions (NMFS 2024b). Although the majority of the mortalities occurred in Canadian waters, the U.S. population is not separated from those in Canada; therefore, the impacts of mortality affect the population considered in the assessment process. While vessel strikes and entanglements in fishing gear represent the most significant threat to NARWs, other risks to the population include acoustic disturbance and masking, climate change, and climate-driven shifts in prey species (Hayes et al. 2023).

In 1994, NMFS designated critical habitat for the NARW population in the North Atlantic Ocean (59 Fed. Reg. 28805 [June 23, 1983]). This critical habitat designation included portions of Cape Cod Bay and Stellwagen Bank, the Great South Channel, and waters adjacent to the coasts of South Carolina, Georgia, and the east coast of Florida. These areas were determined to provide critical feeding, nursery, and calving habitat for the North Atlantic population of NARWs. In 2016, NMFS revised the NARW critical habitat by expanding the previously designated areas. The areas designated as critical habitat currently contain approximately 29,763 square nautical miles of marine habitat, located in the Gulf of Maine and Georges Bank region (Unit 1) and off the southeast U.S. coast (Unit 2). Although both Units 1 and 2 are outside of the proposed Project area, Project vessels may transit through Unit 1 depending on the ports selected and the routes that may be taken by vessels transiting to/from Canada and Europe. Unit 2, which contains the physical and biological features essential to NARW calving habitat, occurs outside of the proposed Project, and no proposed Project vessels are expected to transit through the coastal habitat of Unit 2.

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. 2015). 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). These combinations of factors threaten the survival of this species (Pettis et al. 2017, 2022). If reduced *C. finmarchicus* 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).

The greatest risk to NARW from the proposed Project is from vessel traffic and interactions with fishing gear, which would be present both with and without the proposed Project. Given the number of vessel strikes documented under the UME (NMFS 2024b), ongoing activities which are not associated with offshore wind development, specifically with the proposed Project, are a greater 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, the proposed Project would adhere to vessel strike avoidance measures such as visual monitoring and speed restrictions (Appendix H) 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 (NMFS 2024b). The presence of the proposed Project structures (i.e., WTG and ESP foundations) would contribute to the risk of entanglement if discarded fishing gear were caught in the structures; however, BOEM would require the applicant to routinely monitor for the presence of fishing gear around the WTG and ESP foundations (Appendix H), which would help reduce the likelihood of any NARW becoming entangled. All other IPFs discussed in the Final EIS are not expected to result in mortality. Noise-producing activities such as impact pile driving and potential UXO detonations could result in auditory injury (i.e., PTS), but with mitigation measures such as noise attenuation devices reducing the sound produced by these activities by 10 dB; 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 soft-start procedures for impact pile driving (Appendix H; COP Appendix III-M; Epsilon 2023), no long-term impacts that would rise to the population level are expected to occur due to noise for this species.

B.7.2 Fin Whales

Fin whales are very common over the continental shelf waters from Cape Hatteras, North Carolina, northwards (Hayes et al. 2022). They are typically found along the 328-foot (100-meter) isobath but may also occur in shallower and deeper water, including submarine canyons along the shelf break (Kenney and Winn 1986). Fin whales are migratory, moving seasonally into and out of feeding areas, but their overall migration pattern is complex, and specific routes are not known (Hayes et al. 2022). Although the species occurs year-round in a wide range of latitudes and longitudes, the density of individuals in any one area changes seasonally. Thus, their movements overall are patterned and consistent, but distribution of individuals in a given year may vary according to their energetic and reproductive condition and climatic factors (NMFS 2019b). Acoustic detections from recorders deployed off Nantucket, Massachusetts indicate a year-round presence for fin whales in the vicinity of the proposed Project area, with the highest occurrence in the winter (Palka et al. 2021). Detections were reported for all recorders, regardless of depth, showing fin whales may make use of the entire continental shelf in this region (Palka et al. 2021).

Fin whales are fast swimmers and are often found in social or feeding groups of two to seven individuals (NMFS 2022b). These whales feed during summer and are known to have site fidelity to feeding grounds in New England during this period (Seipt et al. 1990). Fin whales in the North Atlantic feed on pelagic crustaceans (mainly euphausiids or krill) and schooling fish such as capelin (*Mallotus villosus*), Atlantic herring (*Clupea harengus*), and sand lance (Borobia et al. 1995) by skimming the water or lunge feeding. Several studies suggest that distribution and movements of fin whales along the east coast of the United States is influenced by the availability of sand lance (Kenney and Winn 1986; Payne et al. 1990). A biologically important area for feeding has been delineated for the area east of Montauk Point, New York, to the west boundary of the RI/MA Lease Areas between the 49-foot (15-meter) and 164-foot (50-meter) depth contour from March to October (LaBrecque et al. 2015).

Fin whales have been listed as Endangered under the ESA since the act's passage in 1973 (35 Fed. Reg. 8491 [June 2, 1970]). Fin whales in Atlantic U.S. waters belong to the western North Atlantic stock. The best available abundance estimate for the western North Atlantic stock is 6,802, with a minimum population estimate of 5,573 based on shipboard and aerial surveys conducted in 2016 and the 2016 Northeast Fisheries Science Center and Department of Fisheries and Oceans Canada surveys (Hayes et al. 2022). The extents of these two surveys do not overlap; therefore, the survey estimates were added together. NMFS has not conducted a population trend analysis due to insufficient data and irregular survey design (Hayes et al. 2022). The best available information indicates that the gross annual reproduction rate is 8 percent, with a mean calving interval of 2.7 years. 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). No critical habitat has been designated for fin whales within or near the proposed Project area. 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 the proposed Project would not appreciably contribute to additional risk to this species. This species has a PBR of 11 individuals; with only up to 2 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 Project because the anticipated construction window of May through December overlaps with the season that fin whales are expected to have higher densities in the proposed Project area (EIS Section 3.7; BOEM 2023a). However, auditory injuries (i.e., PTS) 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 (Section B.4), the other mitigation measures listed previously for NARW reduce the potential risk of these exposures.

B.7.3 Sei Whales

Sei whales occurring in the U.S. Atlantic Exclusive Economic Zone (EEZ) belong to the Nova Scotia stock. This stock is distributed across the continental shelf waters from the northeast U.S. coast northward to south of Newfoundland (Hayes et al. 2022). This species is highly mobile, and there is no indication that any population remains in a particular area year-round (NMFS 2011). Sei whale occurrence in a particular feeding ground is considered unpredictable or irregular (Schilling et al. 1992) but may be correlated to incursions of relatively warm waters of the Irminger Current off West Greenland (Hayes et al. 2022). Olsen et al. (2009) also indicated that sei whales' movements appear to be associated with oceanic fronts, thermal boundaries, and specific bathymetric features. Further, climate change may affect sei whale habitat availability and food availability, as migration, feeding, and breeding locations may be affected by ocean currents and water temperature (NMFS 2011).

This species is typically sighted on the U.S. Atlantic mid-shelf and the shelf edge and slope (Olsen et al. 2009). Sei whales are usually observed alone or in small groups of two to five animals. Previously, sei whales were believed to occasionally occur in the inshore waters of the Gulf of Maine (Schilling et al. 1992); However, Baumgartner et al. (2011) reported sei whale observations during springtime in the Great South Channel from 2004 to 2010, suggesting that these whales are relatively common in the area. Acoustic detections from recorders deployed off Nantucket show a similar pattern in sei whale presence, with vocalizations detected year-round but a higher number of detections in the spring (Palka et al. 2021). The number of daily detections on the recorders also showed sei whales prefer deeper waters along the shelf edge, although vocalizations were also present at the shallower recorders (Palka et al. 2021).

Sei whales dive 5 to 20 minutes and feed on zooplankton (primarily on calanoid copepods), with a secondary preference for euphausiids (Christensen et al. 1992), krill, small schooling fish, and cephalopods (including squid) by both gulping, skimming, and lunging. They prefer to feed at dawn and may exhibit unpredictable behavior while foraging and feeding on prey (NMFS 2023c).

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 whales per year (Hayes et al. 2022). Threats to sei whales include vessel strike and entanglement in fisheries gear. No population trend is available for this stock. No critical habitat has been designated for sei whales within or near the proposed Project area. 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 2023) is not expected to result in population-level impacts.

B.7.4 Humpback and Minke Whales

The humpback whale can be found worldwide in all major oceans from the equator to subpolar latitudes. Humpback whales found in the proposed Project area belong to the Gulf of Maine Stock. In the summer, humpbacks are found in high-latitude feeding grounds, while during the winter months, individuals migrate to tropical or subtropical breeding grounds to mate and give birth (Hayes et al. 2020). North Atlantic humpback whales feed during the summer in various locations in cooler, temperate regions, including the Gulf of Maine, Newfoundland/Labrador, the Gulf of St. Lawrence, Greenland, Iceland, and Norway, including Svalbard (Wenzel et al. 2020). Available photo-identification and genotyping data indicate humpbacks from all these feeding grounds migrate to the primary winter breeding ground in the Dominican Republic (Wenzel et al. 2020). However, smaller numbers have been observed wintering around the Cape Verde Islands (Wenzel et al. 2020; Cooke 2018). Not all individuals migrate every year, as sightings of humpback whales in the U.S. Northeast Atlantic waters occur throughout the year. In the U.S. Northeast, humpbacks primarily feed on sand lance and other schooling fishes (Risch et al. 2013).

Minke whales are globally distributed in temperature, tropical, and high-latitude waters. Minke whales found in the proposed Project area belong to the Canadian East Coast Stock (Hayes et al. 2022). In the North Atlantic, their distribution changes seasonally, with more time spent near the continental shelf during the summer and fall. In contrast, during winter and spring, they tend to concentrate in deeper ocean waters. Higher densities of minke whales are observed in New England during the spring and fall months

(Hayes et al. 2022). Minke whales in the North Atlantic primarily feed on herring and schooling fish (Lomac-MacNair et al. 2022).

Neither humpback or minke whales in the proposed Project area are listed under the ESA (Hayes et al. 2020, 2022); however, an active UME has been declared for humpback whales due to suspected human interactions from vessel strike, entanglement, or infectious disease (NMFS 2024c). Since 2016, there have been 212 reported humpback whale strandings along the U.S. East Coast, approximately 40 percent of which showed evidence of human interaction from either a vessel strike or entanglement (NMFS 2024c). 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. 2020). 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. 2020).

There are no current population trends or net productivity rates for minke whales due to insufficient data (Hayes et al. 2022). 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). A UME was declared for minke whales in 2017 due to an increase in mortalities resulting from suspected human interaction (e.g., entanglement) and infectious disease, but this UME is pending closure as of 2024 (NMFS 2024d). Since 2017, there have been 164 reported minke whale strandings along the U.S. East Coast (NMFS 2024d).

Similar to the other baleen whale species discussed previously, the greatest risk of vessel strike and entanglement in fisheries gear is a result of ongoing, non-offshore wind activities, and the proposed Project activities 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 (Section B.4) is not expected to result in population-level impacts.

B.7.5 Sperm Whales

Sperm whales are widely distributed throughout the deep waters of the North Atlantic; distribution along the U.S. east coast is concentrated along the shelf break and over the slope (CETAP 1982; Hayes et al. 2020). An exception to this pattern is found in the shallow continental shelf waters of southern New England, where relatively high numbers of sightings have been reported, particularly between late spring and autumn (Scott and Sadove 1997).

Geographic distribution of sperm whales appears to be linked to social structure. Most females form lasting bonds with other related females and their young and form social units of usually 12 females (NMFS 2023d). While females generally stay with the same unit all their lives in and around tropical waters, young males will leave when they are between 4 and 21 years old to form “bachelor schools” with other males of about the same age and size. As males get older and larger, they leave their bachelor schools and begin to migrate toward the poles; the largest males are usually solitary and often found alone (NMFS 2023d). Sperm whales hunt for food during deep dives, with feeding occurring at depths of 1,640 to 3,281 feet (NMFS 2010). Deepwater squid make up the majority of their diet; other prey types include sharks, skates, and fish that occupy deep ocean waters (NMFS 2023d).

The stock structure of the Atlantic population of sperm whales is poorly understood. It is not clear whether the western North Atlantic population is discrete from the eastern North Atlantic population (Hayes et al. 2020). However, the portion of the population found within the U.S. EEZ likely belongs to a larger stock in the western North Atlantic. Sperm whales are listed as Endangered under the ESA as a single, global population, but 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, and while there were 12 strandings documented during this period, none showed any indications of human interaction (Hayes et al. 2020). No critical habitat has been designated for sperm whales within or near the proposed Project area.

No vessel strikes for this species have been reported since 2013. However, sperm whales do face a risk from this IPF (Hayes et al. 2020). 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 large whale 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 LFC hearing group. As a result, the total number of individuals exposed per year to noise above the auditory injury thresholds (JASCO 2023) is not expected to result in population-level impacts.

B.7.6 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 PTS exposures for all these species (Section B.4) are below the annual PBR (Table 3.7-3 in EIS Section 3.7) 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 substantially increase as a result of the proposed Project activities; however, the presence of the proposed Project structures may result in discarded fishing gear being caught around the foundations, creating an entanglement risk for dolphin and small whale species. However, as discussed for NARW previously, BOEM would require the applicant to routinely monitor for the presence of derelict fishing gear around the proposed Project structures, which would help reduce the likelihood of any dolphin or small whale species becoming entangled in fishing gear. Additionally, the presence of the proposed Project structures may also result in a reef effect in which fish aggregating around the foundations would form biological hotspots that could support species range shifts and expansions and changes in the biological community structure resulting from a changing climate (Raoux et al. 2017; Methratta and Dardick 2019; Degraer et al. 2020). The aggregated fishes could provide additional foraging opportunities for dolphins and small whale species present within the proposed Project area, as has been documented for other projects in Europe (Hammar et al. 2010; Lindeboom et al. 2011).

B.7.7 Harbor Porpoises

Harbor porpoises in the proposed Project Area belong to the Gulf of Maine/Bay of Fundy stock, distributed in U.S. and Canadian Atlantic waters. Their distribution changes seasonally. During the summer, they concentrate in coastal waters, staying in depths less than 150 meters. In non-summer months, they have been observed in coastal to deep waters (>1,800 meters deep) (Westgate et al. 1998). Specifically, in summer, they are mainly concentrated in the northern Gulf of Maine, southern Bay of Fundy, and around the southern tip of Nova Scotia. In the fall, they disperse from New Jersey to Maine, with some distribution farther north and south. In winter, they are observed off New Jersey to North Carolina, with lower densities from New York to New Brunswick, Canada. Despite these seasonal changes, harbor porpoises do not exhibit a distinct migratory route (Hayes et al. 2022). Gulf of Maine

Harbor porpoises primarily feed on schooling fishes, showing a preference for herring and small gadids. However, these same schooling fishes are also targeted by larger fishes, which become the focus of commercial fisheries. This creates an overlap in foraging areas between harbor porpoises and fisheries (Read 2013).

Harbor porpoises present in the proposed Project area are not listed under the ESA, but they are listed as Least Concern by the IUCN Red List and are considered non-strategic under the Marine Mammals Protection Act (Braulik et al. 2020; 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 NOAA and Fisheries and Oceans Canada between the Gulf of St. Lawrence / Bay of Fundy/Scotian Shelf and Central Virginia (Hayes et al. 2022). A population trend analysis is not available because data are insufficient for this species (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 impacts 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). There is no designated critical habitat for this species near the proposed Project area.

Harbor porpoises belong to the HFC hearing group, which have lower acoustic thresholds for PTS (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 2023). Although the number of annual PTS 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 increased risk of secondary entanglement in fishing gear caught around the proposed Project structures would not contribute a substantial increase in risk for this species. Given the proposed mitigation (Appendix H), the likelihood of entanglement in fishing gear around the proposed Project structures is low for any harbor porpoise present in the proposed Project area. Similar to the discussion for dolphins and small whale species, the reef effect resulting from the presence of the structures could provide additional foraging opportunities for this species as documented for other artificial reef sites (Mikkelsen et al. 2013).

B.7.8 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 in response to an increase in the number of sick and dead individuals reported along the southern and central coast of Maine; 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 2024e). This UME was closed in January 2024, with a total count of 181 seals stranded—including 143 harbor seals, 28 gray seals, and 10 seals of unidentified species (NMFS 2024e).

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 proposed Project would not appreciably contribute to increased risk to these species. Furthermore, the 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 be reduced with the proposed monitoring and mitigation of fishing gear around the proposed Project structures (Appendix H). The reef effect due to the presence of the proposed Project structures may also provide additional foraging opportunities for seal species as evidenced by other studies of artificial reef habitat (Arnould et al. 2015; Russell et al. 2014).

The total number of annual PTS exposures estimated for these species for noise meeting or exceeding the auditory injury thresholds (Section B.4) 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.8 Impacts on Sea Turtles Potentially Present in the Proposed Project Area

This section provides supplemental information for the discussion of potential impacts on sea turtles provided in EIS Section 3.8 for sea turtle species that may face additional risk from certain IPFs 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.8.1 Loggerhead Sea Turtles

Loggerhead sea turtles have a worldwide distribution and inhabit temperate and tropical waters, including estuaries and continental shelves of both hemispheres. Globally, loggerhead sea turtles are divided into nine distinct population segments (DPS) with varying federal (ESA) statuses. Individuals that occur in the proposed Project area are members of the Northwest Atlantic DPS.

Female loggerhead sea turtles in the western North Atlantic nest from late April through early September. Individual females might nest several times within one season and usually nest at intervals of every 2 to 3 years. For their first 7 to 12 years of life, loggerhead sea turtles inhabit pelagic waters near the North Atlantic Gyre and are called pelagic immatures. When loggerhead sea turtles reach 16 to 24 inches straight-line carapace length, they begin recruiting to coastal inshore and nearshore waters of the OCS through the U.S. Atlantic and Gulf of Mexico and are referred to as benthic immatures. Benthic immature loggerheads have been found in waters from Cape Cod, Massachusetts, to southern Texas. Most recent estimates indicate that the benthic immature stage ranges from ages 14 to 32 years; they reach sexual maturity at approximately 20 to 38 years of age. Loggerhead sea turtles are largely present year-round in waters south of North Carolina but will forage during summer and fall as far north as the northeastern United States and Canada and migrate south as water temperatures drop. Prey species for omnivorous juveniles include crab, mollusks, jellyfish, and vegetation at or near the surface. Coastal subadults and adults feed on benthic invertebrates, including mollusks and decapod crustaceans (TEWG 2009). The most recent (2010) regional abundance estimate for loggerhead sea turtles in the Northwest Atlantic OCS water was approximately 588,000 individuals (NEFSC and SEFSC 2011). The three largest nesting subpopulations responsible for most of the production in the western North Atlantic (Peninsular Florida, Northern United States, and Quintana Roo, Mexico) have all been declining since at least the late 1990s, indicating a downward trend for this population (TEWG 2009).

Critical habitat for Northwest Atlantic Ocean DPS of loggerhead sea turtles was designated in 2014 (79 Fed. Reg. 39755 [July 10, 2014]; 79 Fed. Reg. 51264 [August 28, 2014]). The species' critical habitat includes overwintering, migratory, and nearshore reproductive habitat extending from North Carolina to Mississippi. Additionally, critical sargassum habitat extends from offshore Texas to as far north as New Jersey, though the northern extent of this habitat is located far beyond the OCS edge (NMFS 2022a). No designated critical habitat occurs within the proposed Project area. Factors affecting the conservation and recovery of this species include beach development, related human activities that damage nesting habitat, and light pollution (NMFS and USFWS 2008). In-water threats include bycatch in commercial fisheries, vessel strikes, anthropogenic noise, marine debris, legal and illegal harvest, oil pollution, and predation by native and exotic species (NMFS and USFWS 2008).

The greatest risk to loggerhead sea turtles from the proposed Project is from vessel traffic and interactions with fishing gear, which would be present both with and without the proposed Project. Vessel-animal collisions are a measurable and increasing source of mortality and injury for sea turtles; the percentage of stranded loggerhead sea turtles with injuries that were apparently caused by vessel strikes increased from approximately 10 percent in the 1980s to over 20 percent in 2004, although some stranded turtles may have been struck post-mortem (NMFS and USFWS 2008). Sea turtles are expected to be most vulnerable to vessel strikes in coastal foraging areas and may not be able to avoid collisions when vessel speeds exceed 2 knots (Hazel et al. 2007). Vessels traveling at higher speeds pose a higher risk to sea turtles. To reduce the risk of lethal injury to loggerhead sea turtles from vessel strikes by 50 percent, Sapp (2010) found that small vessels (10 to 30 feet in length) had to slow down to 7.5 knots; the probability of lethal injury decreased by 60 percent for vessels idling at 4 knots. Foley et al. (2008) further indicated that vessel speed greater than 4 knots may cause serious injury or mortality to sea turtles. The recovery plan for loggerhead sea turtles (NMFS and USFWS 2008) notes from 1997 to 2005, 14.9 percent of all stranded loggerheads in the U.S. Atlantic and Gulf of Mexico were documented as having some type of propeller or collision injuries, although it is not known what proportion of these injuries occurred before or after the turtle died. However, the proposed Project would adhere to vessel strike avoidance measures such as visual monitoring and speed restrictions (Appendix H), which would reduce the risk of vessel strikes and associated mortality. Similarly, the risk faced by entanglements in fishing gear due to the presence of proposed Project structures could increase the risk of sea turtle entanglement in both lines and nets and increasing the risk of injury and mortality due to ingestion, infection, starvation, or drowning (Nelms et al. 2016; Gall and Thompson 2015; Shigenaka et al. 2010; Barnette 2017). However, as discussed for marine mammals in Section B.7, Impacts on Marine Mammals, BOEM would require the applicant to routinely monitor for the presence of fishing gear around the WTG and ESP foundations (Appendix H), which would help reduce the likelihood of any loggerhead sea turtle becoming entangled. All other IPFs discussed in the EIS are not expected to result in mortality. Noise-producing activities such as impact pile driving and potential UXO detonations could result in auditory injury (i.e., PTS), but with mitigation measures such as noise attenuation devices reducing the sound produced by these activities by 10 dB; visual and acoustic monitoring before, during and after the activity; and shutdown and ramp-up procedures for impact pile driving (Appendix H; COP Appendix III-M; Epsilon 2023), and though impacts on individuals may occur, no long-term impacts that would rise to the population level are expected to occur due to noise for this species.

B.8.2 Leatherback Sea Turtles

The leatherback sea turtle is primarily a pelagic species and distributed in temperate and tropical waters worldwide. The leatherback is the largest, deepest diving, most migratory, widest ranging, and most pelagic of the sea turtles (NMFS 2023e). Adult leatherback sea turtles forage in temperate and subpolar regions of all oceans. Satellite tagged adults reveal migratory patterns in the North Atlantic that can include a circumnavigation of the North Atlantic Ocean basin, following ocean currents that make up the North Atlantic Gyre and preferentially targeting warm-water mesoscale ocean features such as eddies and rings as favored foraging habitats (Hays et al. 2006). Soft-bodied animals such as jellyfish and salps are the major component of the leatherback diet; they are also known to feed on sea urchins, squid, crustaceans, tunicates, fish, blue-green algae, and floating seaweed (NMFS 2023e; USFWS 2022a).

Historically, the most important nesting ground for the leatherback was the Pacific coast of Mexico. However, because of exponential declines in leatherback nesting, French Guiana in the Western Atlantic now has the largest nesting population. Other important nesting sites for the leatherback include Papua New Guinea, Papua-Indonesia, and the Solomon Islands in the Western Pacific. In the U.S., nesting sites include the Florida east coast; Sandy Point, U.S. Virgin Islands; and Puerto Rico. U.S. nesting occurs from March through July. On average, individual females nest every 2 to 3 years, laying an average of 5 to 7 nests per season with an average clutch size of 70 to 80 eggs (USFWS 2022a).

The leatherback sea turtle has been federally listed as Endangered under the ESA since 1970 and is considered Vulnerable by the IUCN Red List (IUCN 2022; NMFS 2023e). In 2017, NMFS received a petition to identify the northwest Atlantic subpopulation as a DPS and list it as Threatened under the ESA. In response to this petition, NMFS initiated a status review for the leatherback sea turtle to include new data made available since the original listing (82 Fed. Reg. 57565 [December 6, 2017]). The status review was completed, and NMFS concluded there was not sufficient evidence to designate any DPS for leatherback sea turtles. Threats to this population include fisheries bycatch, habitat loss, nest predation, and marine pollution (USFWS 2022a). While critical habitat for this species was designated in waters adjacent to Sandy Point Beach, U.S. Virgin Islands in 1979 (44 Fed. Reg. 17710 [March 23, 1979]), there is no designated critical habitat within the proposed Project area. Similar to loggerhead sea turtles, 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 the proposed Project would not appreciably contribute to additional risk to this species. However, with the proposed mitigation measures (Appendix H), the risk of a vessel strike that results in mortality or serious injury is lowered, and the likelihood of entanglement in fishing gear caught on proposed Project structures is extremely low. Additionally, with mitigation measures implemented, no long-term impacts that would rise to the population level are expected to occur due to noise for this species.

B.8.3 Kemp's Ridley Sea Turtle

Kemp's ridley sea turtles occur off the coast of the Gulf of Mexico and along the U.S. Atlantic Coast (TEWG 2000). Juveniles inhabit the U.S. Atlantic Coast from Florida to the Canadian Maritime Provinces. In late fall, Atlantic juveniles/subadults travel northward to forage in the coastal waters off Georgia through New England, then return southward for the winter (Stacy et al. 2013; New York State Department of Environmental Conservation 2022). Preferred habitats include sheltered areas along the coastline, such as estuaries, lagoons, and bays (NMFS 2022c). Kemp's ridley sea turtles are opportunistic foragers, feeding on decapod crustaceans, shellfish, and fish (NMFS 2022c). Sixty percent of Kemp's ridley nesting occurs on beaches near Rancho Nuevo, Tamaulipas, Mexico. The nesting season spans from April through July (NMFS and USFWS 2007). On average, individual females nest every 1 to 2 years, with an average of 1 to 3 clutches every season and an average clutch size of 110 eggs per nest (NMFS and USFWS 2007).

The Kemp's ridley sea turtle population was severely decimated in 1985 due to intensive egg collection and fishery bycatch, with only 702 nests counted during the entire year (NMFS and USFWS 2015; Bevan et al. 2016). After initiation of conservation measures, the population increased through 2009; however, since 2009, there has been a noted decline in nests (NMFS and USFWS 2015). Evaluations of hypothesized causes of the nesting setback, including the Deepwater Horizon oil spill in 2010, have been inconclusive, and experts suggest that various natural and anthropogenic causes could have contributed to the nesting setback either separately or synergistically (Caillouet et al. 2018). Despite the increased number of local strandings in 2014, recent models indicate a persistent reduction in survival and/or recruitment to the nesting population, suggesting that the population is not recovering. Current threats include bycatch from some fisheries, marine debris, and boat strikes (NMFS and USFWS 2015). There is no designated critical habitat for Kemp's ridley sea turtles, and although they typically only nest in the Southeast and Mid-Atlantic U.S. states, there has been one report of Kemp's ridley sea turtle nesting in the Gateway National Recreation Area in Long Island, New York, in 2018 (Yun 2018).

Similar to loggerhead sea turtles, 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 the proposed Project would not appreciably contribute to additional risk to this species. However, with the proposed mitigation measures (Appendix H), the risk of a vessel strike that results in mortality or serious injury is lowered, and the likelihood of entanglement in fishing gear caught on proposed Project structures is extremely low. Additionally, with mitigation measures implemented, no long-term impacts that would rise to the population level are expected to occur due to noise for this species.

B.8.4 Green Sea Turtle

Green sea turtles have a worldwide distribution and can be found in both tropical and subtropical waters (NMFS and USFWS 1991; NatureServe 2022). In the Western North Atlantic Ocean, they can be found from Massachusetts to Texas, as well as in waters off Puerto Rico and the U.S. Virgin Islands (NMFS and USFWS 1991). Green sea turtles are divided into 11 DPSs with varying ESA statuses. Individuals found in Virginia are members of the North Atlantic DPS. Depending on the life stage, green sea turtles inhabit high-energy oceanic beaches, convergence zones in pelagic habitats, and benthic feeding grounds in shallow protected waters (NMFS and USFWS 1991). Green sea turtles are known to make long-distance migrations between their nesting and feeding grounds. Hatchlings occupy pelagic habitats and are omnivorous. Juvenile foraging habitats include coral reefs, emergent rocky bottoms, sargassum spp. mats, lagoons, and bays (USFWS 2022b). Once mature, green sea turtles leave pelagic habitats and enter benthic foraging grounds, primarily feeding on seagrasses and algae (Bjorndal 1997), although they will occasionally feed on sponges and invertebrates (NMFS 2023f).

The primary nesting beaches for the North Atlantic DPS of green sea turtles are Costa Rica, Mexico, Florida, and Cuba. In the U.S., the species also nest in North Carolina, South Carolina, Georgia, the U.S. Virgin Islands, and Puerto Rico (USFWS 2022b). Nesting seasons vary by region. On average, individual females nest every 2 to 4 years, laying an average of 3.3 nests per season at approximately 13-day intervals. The average clutch size is approximately 136 eggs, and incubation ranges from 45 to 75 days (USFWS 2022b). According to Seminoff et al. (2015), nesting trends are generally increasing for this DPS. The only critical habitat for green sea turtles has been designated in Puerto Rico around Culebra Island (NMFS 2023f), which is outside the proposed Project area.

Similar to loggerhead sea turtles, 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 the proposed Project would not appreciably contribute to additional risk to this species. However, with the proposed mitigation measures (Appendix H), the risk of a vessel strike that results in mortality or serious injury is lowered, and the likelihood of entanglement in fishing gear caught on proposed Project structures is extremely low. Additionally, with mitigation measures implemented, no long-term impacts that would rise to the population level are expected to occur due to noise for this species.

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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 (BOEM 2018).

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 Final 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 Final 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 Final EIS considers the interrelationship between aspects of the PDE rather than simply independently viewing each design parameter. This Final EIS also provides the analysis for the impacts of the maximum-case scenario alongside other reasonably foreseeable past, present, and future actions.

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.

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		935 ft MLLW
Tip clearance	89 ft MLLW[d]	
Tower diameter for WTG	20 ft	33 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[g]	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 Final 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 2023).

[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.

[g] 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 2023). As a result, Phase 1 could include 64 foundations at 62 WTG/ESP positions. However, under the Preferred Alternative, BOEM is disallowing the co-location of ESPs.

[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; All could be monopiles, jacket, or bottom-frame foundations; 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[g]	Up to 3 ESP foundations; 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 (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)		192 nm
Typical separation distance of export cable (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 proposed Project OECC/Western Muskeget OECC Variant	Dowses Beach	Wianno Avenue
Length of onshore cable utilizing proposed Project 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 Final 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 2023).

[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.

[g] 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 2023). 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	Non-Tidal Waters and Wetlands	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	Non-Tidal Waters and Wetlands	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 monopile s (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 occupyin g 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 occupyin g 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	Non-Tidal Waters and Wetlands	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
Minimum 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
Minimum 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 Final 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	Non-Tidal Waters and Wetlands	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	Non-Tidal Waters and Wetlands	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	Non-Tidal Waters and Wetlands	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	Non-Tidal Waters and Wetlands	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 occupyin g 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	Non-Tidal Waters and Wetlands	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 Final 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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C.1 References

BOEM (Bureau of Ocean Energy Management). 2018. *Draft Guidance Regarding the Use of a Project Design Envelope in a Construction and Operations Plan.* January 12, 2018. Accessed: July 2023. Retrieved from: https://www.boem.gov/sites/default/files/renewable-energy-program/Draft-Design-Envelope-Guidance.pdf

Epsilon (Epsilon Associates, Inc.). 2023. *Draft New England Wind Construction and Operations Plan for Lease Area OCS-A 0534*. New England Wind Project. Retrieved from: https://www.boem.gov/renewable-energy/state-activities/new-england-wind-ocs-0534-construction-and-operations-plan

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Appendix D
Geographical Analysis Areas

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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 Final Environmental Impact Statement (EIS; Table D-1). While some species have ranges that extend beyond the geographic analysis areas described below, the analysis in this Final EIS focuses on impacts within each resource's geographic analysis areas.

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 2023). 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 EIS.
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.).

Resource	Geographic Analysis Area
Finfish, Invertebrates, and Essential Fish Habitat	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.
Marine Mammals	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).
Sea Turtles	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.
Terrestrial Habitats and Fauna	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.
Non-Tidal Waters and Wetlands	The geographic analysis area for waters of the United States and navigable waters includes onshore development areas within the Cape Cod watershed (hydrologic unit code 0109000202), as well as tidal waters within the U.S. Army Corps of Engineers (USACE) jurisdiction, which extends from the high tide line to the limits of the Outer Continental Shelf. Certain non-tidal waters and wetlands are subject to USACE jurisdiction under Section 404 of the Clean Water Act. Under Section 404 of the Clean Water Act, USACE regulates the discharge of dredged or fill material into waters of the United States. The landward limit of jurisdiction in tidal waters (33 CFR § 328.4) extends to the high tide line, whereas the seaward limit is 3 nautical miles (3.5 miles), as measured from the baseline of the territorial seas. The USACE limits of jurisdiction in non-tidal waters is as follows: • In the absence of adjacent wetlands, the jurisdiction extends to the ordinary high water mark. • 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 United States consists only of wetlands, the jurisdiction extends to the limit of the wetland. To avoid duplication of analysis, the evaluation of impacts on wetlands and waters of the United States 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. Outer Continental Shelf are discussed in EIS Section G.2.2, Water Quality, as well as other resource sections related to open water environments.
Commercial Fisheries and For-Hire Recreational Fishing	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.

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: • 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; • 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 • 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 USACE before approving offshore wind cable routes, avoiding impacts on known borrow areas. **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. **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. **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. **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. **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 EIS 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; USACE = U.S. Army Corps of Engineers; WTG = wind turbine generator

D.1 References

Epsilon (Epsilon Associates, Inc.). 2023. *Draft New England Wind Construction and Operations Plan for Lease Area OCS-A 0534*. New England Wind Project. Retrieved from: https://www.boem.gov/renewable-energy/state-activities/new-england-wind-ocs-0534-construction-and-operations-plan

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Appendix E
Planned Activities Scenario

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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 the other foreseeable (i.e., planned) activities that are likely to occur in close proximity to, and during the same timeframe, as the Proposed Action.. 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 together 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 as early as 2024 and the completion of proposed Project decommissioning, which would occur within 2 years of the end of the lease (up to 33 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 Final 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.

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[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 Final 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."

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 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; and (9) 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 April 5, 2023. 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 EIS 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.

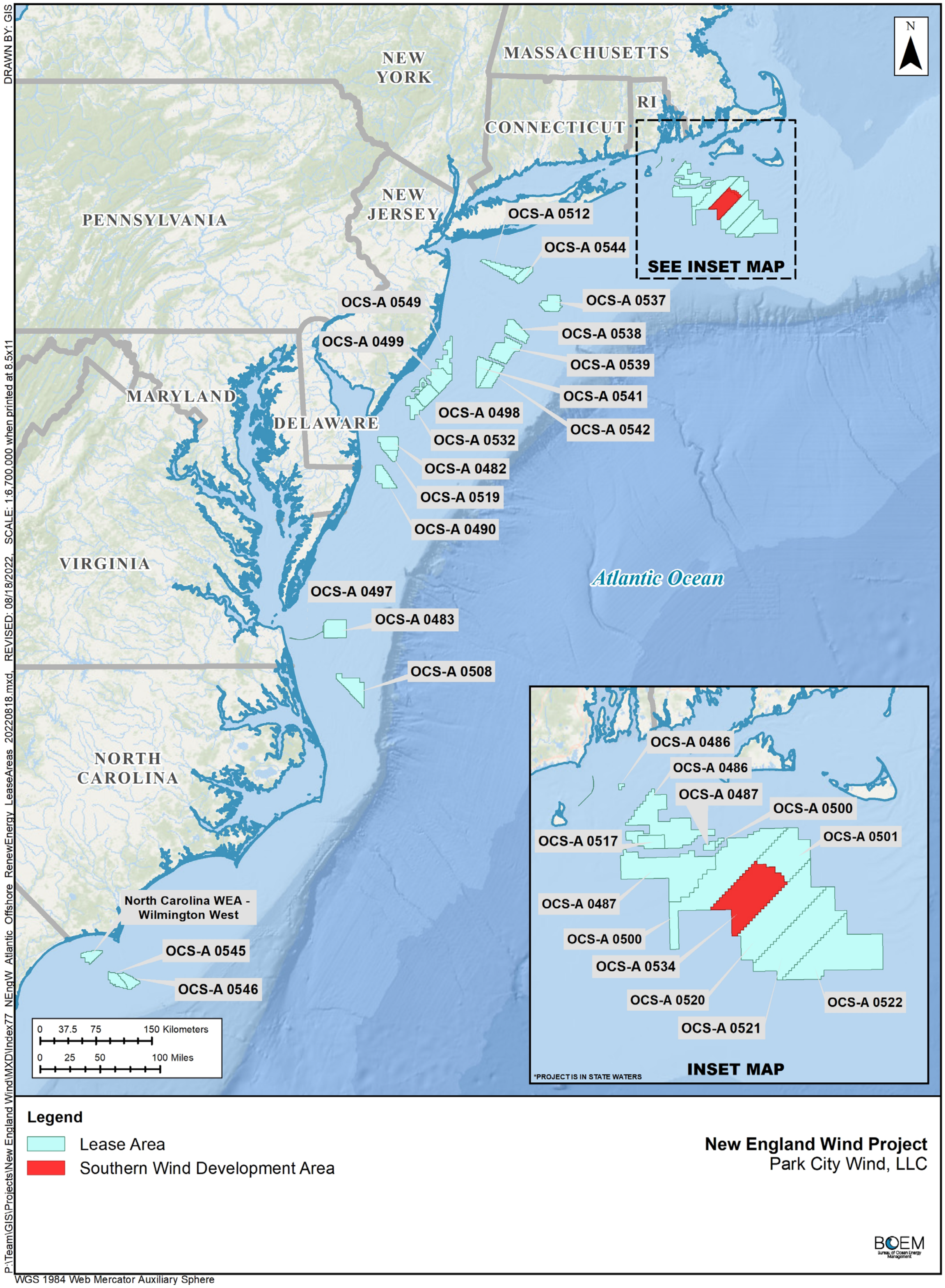

Figure E-1: Wind Lease Areas Considered in Planned Activities Offshore Wind Scenario

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Table E-1: Offshore Wind Leasing Activities on the Atlantic Outer Continental Shelf: Projects and Assumptions (as of July 12, 2023)

			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	12	-	12	-	12	12	12	12	12	12	12	12
MA/RI	486	Sunrise Wind	94	81	94	-	94	94	94	94	94	94	94	94
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	88	88	88	88	88	88	88	88	88	89	88	88
MA/RI	521	South Coast Wind	147	147	147	49	147	147	147	147	147	135	76	147
MA/RI	520	Beacon Wind Phase 1 and 2	164	164	164	164	164	164	164	164	164	164	110	164
MA/RI	500	Bay State Wind	94	94	94	165	94	94	94	94	94	94	89	94
MA/RI	522	Vineyard Northeast Wind	160	-	160	-	160	160	160	-	160	131	47	160
MA/RI	500, 487	Remainder of projects	116	-	116	51	116	116	116	-	116	50	-	116
		Total MA/RI Leases	**1,099**	**710**	**1,099**	**681**	**1,099**	**1,099**	**1,099**	**823**	**1,099**	**972**	**740**	**1,099**
		MA/RI Leases without NE Wind	***949***	***560***	***949***	***531***	***949***	***949***	***949***	***673***	***949***	***842***	***590***	***949***
NY/NJ	498	Ocean Wind	98	-	-	-	-	98	98	-	98	-		-
NY/NJ	512	Empire Wind 1	57	-	-	-	-	57	57	-	57	-		-
NY/NJ	512	Empire Wind 2	90	-	-	-	-	90	90	-	90	-		-
NY/NJ	499	Atlantic Shores South	200	-	-	-	-	200	200	-	200	-		-
NY/NJ	532	Ocean Wind 2	109	-	-	-	-	109	109	-	109	-		-
NY/NJ	549	Atlantic Shores North	157	-	-	-	-	157	157	-	157	-		-
NY/NJ	537	OW Ocean Winds East OCS	80	-	-	-	-	80	80	-	80	-		-
NY/NJ	538	Attentive Energy	100	-	-	-	-	100	100	-	100	-		-
NY/NJ	539	Bight Wind Holdings	145	-	-	-	-	145	145	-	145	-		-
NY/NJ	541	Atlantic Shores Offshore Wind Bight	93	-	-	-	-	93	93	-	93	-		-
NY/NJ	542	Invenergy Wind Offshore	97	-	-	-	-	97	97	-	97	-		-
NY/NJ	544	Vineyard Mid-Atlantic	102	-	-	-	-	102	102	-	102	-		-
		Total NY/NJ Leases	**1,328**	**-**	**-**	**-**	**-**	**1,328**	**1,328**	**-**	**1,328**	**-**		**-**
DE/MD	519	Skipjack	16	-	-	-	-	16	16	-	16	-		-
DE/MD	490	US Wind	121	-	-	-	-	121	121	-	121	-		-
DE/MD	482, 519	GSOE I and remainder	94	-	-	-	-	94	94	-	94	-		-
		Total DE/MD Leases	**231**	**-**	**-**	**-**	**-**	**231**	**231**	**-**	**231**	**-**		**-**
														-
VA/NC	497	CVOW Demonstration	2	-	-	-	-	2	2	-	2	-		-
VA/NC	483	CVOW	202	-	-	-	-	202	202	-	202	-		-
VA/NC	508	Kitty Hawk Wind North	69	-	-	-	-	69	69	-	69	-		-
VA/NC	545	Total Energies	64	-	-	-	-	64		-	64	-		-
VA/NC	546	Duke Energy	64	-	-	-	-	64		-	64	-		-
VA/NC	508	Kitty Hawk South	121	-	-	-	-	121	121	-	121	-		-
		Total VA/NC Leases	**522**	**-**	**-**	**-**	**-**	**522**	**394**	**-**	**522**	**-**		**-**
		Atlantic OCS Total	**3,187**	**710**	**1,099**	**681**	**1,099**	**3,187**	**3,059**	**823**	**3,187**	**972**	**740**	**1,099**
		Atlantic OCS Total Without NE Wind	***3,037***	***560***	***949***	***531***	***949***	***3,037***	***2,909***	***673***	***3,037***	***842***	***590***	***949***

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	13	-	13	-	13	13	13	13	13	13	13
MA/RI	486	Sunrise Wind	95	81	95	-	95	95	95	95	95	95	95
MA/RI	487	Revolution Wind	102	12	102	40	102	102	102	102	102	102	102
MA/RI	534	New England Wind Phase 1	64	64	64	64	64	64	64	64	64	41	64
MA/RI	534	New England Wind Phase 2	91	91	91	91	91	91	91	91	91	89	91
MA/RI	521	South Coast Wind	149	149	149	49	149	149	149	149	149	149	149
MA/RI	520	Beacon Wind Phase 1 and 2	166	166	166	166	166	166	166	166	166	166	166
MA/RI	500	Bay State Wind	96	96	96	165	96	96	96	96	96	96	96
MA/RI	522	Vineyard Northeast Wind	160	-	160	-	160	160	160	-	160	160	160
MA/RI	500, 487	Remainder of projects	119	-	119	51	119	119	119	-	119	119	119
		Total MA/RI Leases	**1,118**	**722**	**1,118**	**689**	**1,118**	**1,118**	**1,118**	**839**	**1,118**	**1,093**	**1,118**
		MA/RI Leases without NE Wind	***963***	***567***	***963***	***534***	***963***	***963***	***963***	***684***	***963***	***963***	***963***
NY/NJ	498	Ocean Wind	101	-	-	-	-	101	101	-	101	-	-
NY/NJ	512	Empire Wind 1	58	-	-	-	-	58	58	-	58	-	-
NY/NJ	512	Empire Wind 2	91	-	-	-	-	91	91	-	91	-	-
NY/NJ	499	Atlantic Shores South	210	-	-	-	-	210	210	-	210	-	-
NY/NJ	532	Ocean Wind 2	111	-	-	-	-	111	111	-	111	-	-
NY/NJ	549	Atlantic Shores North	165	-	-	-	-	165	165	-	165	-	-
NY/NJ	537	OW Ocean Winds East OCS	82	-	-	-	-	82	82	-	82	-	-
NY/NJ	538	Attentive Energy	102	-	-	-	-	102	102	-	102	-	-
NY/NJ	539	Bight Wind Holdings	148	-	-	-	-	148	148	-	148	-	-
NY/NJ	541	Atlantic Shores Offshore Wind Bight	95	-	-	-	-	95	95	-	95	-	-
NY/NJ	542	Invenergy Wind Offshore	99	-	-	-	-	99	99	-	99	-	-
NY/NJ	544	Vineyard Mid-Atlantic	104	-	-	-	-	104	104	-	104	-	-
		Total NY/NJ Leases	**1,366**	**-**	**-**	**-**	**-**	**1,366**	**1,366**	**-**	**1,366**	**-**	**-**
DE/MD	519	Skipjack	17	-	-	-	-	17	17	-	17	-	-
DE/MD	490	US Wind	125	-	-	-	-	125	125	-	125	-	-
DE/MD	482, 519	GSOE I and remainder	96	-	-	-	-	96	96	-	96	-	-
		Total DE/MD Leases	**238**	**-**	**-**	**-**	**-**	**238**	**238**	**-**	**238**	**-**	**-**
													-
VA/NC	497	CVOW Demonstration	2	-	-	-	-	2	2	-	2	-	-
VA/NC	483	CVOW	205	-	-	-	-	205	205	-	205	-	-
VA/NC	508	Kitty Hawk Wind North	70	-	-	-	-	70	70	-	70	-	-
VA/NC	545	Total Energies	65	-	-	-	-	65		-	65	-	-
VA/NC	546	Duke Energy	65	-	-	-	-	65		-	65	-	-
VA/NC	508	Kitty Hawk South	123	-	-	-	-	123	123	-	123	-	-
		Total VA/NC Leases	**530**	**-**	**-**	**-**	**-**	**530**	**400**	**-**	**530**	**-**	**-**
		Atlantic OCS Total	**3,259**	**722**	**1,118**	**689**	**1,118**	**3,259**	**3,129**	**839**	**3,259**	**3,259**	**3,259**
		Atlantic OCS Total Without NE Wind	***3,104***	***567***	***963***	***534***	***963***	***3,104***	***2,974***	***684***	***3,104***	***3,129***	***3,104***

					Total Footprint of Foundations (Acres)									
Region	**Lease**	**Name**	**OECC Length (mi)**	**Inter-Array + Inter-Link Cable Length (mi)**	**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			**1.0**						**-**			
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	5.5	5.5	-	-	5.5	5.5	6	5.5	5.5	5.5
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	South Coast 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 Phase 1 and 2	120	417	8.3	8.3	8.3	-	8.3	8.3	8	8.3	8.3	8.3
MA/RI	500	Bay State Wind	120	239	4.8	4.8	8.3	-	4.8	4.8	5	4.8	4.8	4.8
MA/RI	522	Vineyard Northeast Wind	120	407	8.0	8.0	-	-	8.0	8.0	8	-	8.0	8.0
MA/RI	500, 487	Remainder of projects	-	295	6.0	6.0	6.0	-	6.0	6.0	6	-	6.0	6.0
		Total MA/RI Leases	**1,794.3**	**2,795.0**	**65.6**	**65.6**	**32.7**	**4.4**	**65.6**	**65.6**	**66**	**51.7**	**65.6**	**65.6**
		MA/RI Leases without NE Wind	***1,448***	***2,404***	***61.2***	***61.2***	***28.3***	***-***	***61.2***	***61.2***	***61***	***47.3***	***61.2***	***61.2***
NY/NJ	498	Ocean Wind	71	190	3.0					3.0	3		3.0	
NY/NJ	512	Empire Wind 1	46	133	34.1					34.1	34		34.1	
NY/NJ	512	Empire Wind 2	30	166	53.5					53.5	54		53.5	
NY/NJ	499	Atlantic Shores South	99	292	36.5					36.5	37		36.5	
NY/NJ	532	Ocean Wind 2			5.6					5.6	6		5.6	
NY/NJ	549	Atlantic Shores North			28.7					28.7	29		28.7	
NY/NJ	537	OW Ocean Winds East OCS			4.1					4.1	4		4.1	
NY/NJ	538	Attentive Energy			5.1					5.1	5		5.1	
NY/NJ	539	Bight Wind Holdings			7.4					7.4	7		7.4	
NY/NJ	541	Atlantic Shores Offshore Wind Bight			4.8					4.8	5		4.8	
NY/NJ	542	Invenergy Wind Offshore			5.0					5.0	5		5.0	
NY/NJ	544	Vineyard Mid-Atlantic			5.2					5.2	5		5.2	
		Total NY/NJ Leases			**193.0**	**-**	**-**		**-**	**193.0**	**193**	**-**	**193.0**	**-**
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, 519	GSOE I and remainder			4.8					4.8	5		4.8	
		Total DE/MD Leases			**9.3**	**-**	**-**		**-**	**9.3**	**9**	**-**	**9.3**	**-**
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 North	112	149	20.8					20.8	21		20.8	
VA/NC	545	Total Energies			3.3					3.3			3.3	
VA/NC	546	Duke Energy			3.3					3.3			3.3	
VA/NC	508	Kitty Hawk South	200	149	6.2					6.2	6		6.2	
		Total VA/NC Leases			**74.1**	**-**	**-**		**-**	**74.1**	**68**	**-**	**74.1**	**-**
		Atlantic OCS Total			**343.0**	**65.6**	**32.7**	**4**	**65.6**	**342.0**	**335**	**51.7**	**342.0**	**65.6**
		Atlantic OCS Total Without NE Wind			***339***	***61***	***28***	***-***	***61***	***338***	***331***	***47***	***338***	***61***

			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	**6**						-			
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	11.0	11.0	-	-	11.0	11.0	11	11.0	11.0	11.0
MA/RI	486	Sunrise Wind	97.6	97.6		-	97.6	97.6	98	97.6	97.6	97.6
MA/RI	487	Revolution Wind	74.0	74.0	29.6	-	74.0	74.0	74	74.0	74.0	74.0
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	South Coast 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 Phase 1 and 2	798.0	798.0	798.0	-	798.0	798.0	798	798.0	798.0	798.0
MA/RI	500	Bay State Wind	113.0	113.0	113.0	-	113.0	113.0	113	113.0	113.0	113.0
MA/RI	522	Vineyard Northeast Wind	3.8	3.8	-	-	3.8	3.8	4	-	3.8	3.8
MA/RI	500, 487	Remainder of projects	137.0	137.0	137.0	-	137.0	137.0	137	-	137.0	137.0
		Total MA/RI Leases	**3,242.1**	**3,242.1**	**1,954.0**	**278.0**	**3,242.1**	**3,242.1**	**3,242**	**3,101.3**	**3,242.1**	**3,242.1**
		MA/RI Leases without NE Wind	***2,964.1***	***2,964.1***	***1,676.0***	***-***	***2,964.1***	***2,964.1***	***2,964***	***2,823.3***	***2,964.1***	***2,964.1***
NY/NJ	498	Ocean Wind	84.0					84.0	84		84.0	
NY/NJ	512	Empire Wind 1	52.4					52.4	52		52.4	
NY/NJ	512	Empire Wind 2	82.8					82.8	83		82.8	
NY/NJ	499	Atlantic Shores South	289.0					289.0	289		289.0	
NY/NJ	532	Ocean Wind 2	130.0					130.0	130		130.0	
NY/NJ	549	Atlantic Shores North	190.00					190.0	190		190.0	
NY/NJ	537	OW Ocean Winds East OCS	103.0					103.0	103		103.0	
NY/NJ	538	Attentive Energy	129.0					129.0	129		129.0	
NY/NJ	539	Bight Wind Holdings	186.0					186.0	186		186.0	
NY/NJ	541	Atlantic Shores Offshore Wind Bight	120.0					120.0	120		120.0	
NY/NJ	542	Invenergy Wind Offshore	125.0					125.0	125		125.0	
NY/NJ	544	Vineyard Mid-Atlantic	131.0					131.0	131		131.0	
		Total NY/NJ Leases	**1,622**	**-**	**-**		**-**	**1,622**	**1,622**	**-**	**1,622**	**-**
DE/MD	519	Skipjack	21.0					21.0	21		21.0	
DE/MD	490	US Wind	158.0					158.0	158		158.0	
DE/MD	482, 519	GSOE I and remainder	121.0					121.0	121		121.0	
		Total DE/MD Leases	**300.0**	**-**	**-**		**-**	**300.0**	**300**	**-**	**300.0**	**-**
VA/NC	497	CVOW Demonstration	2.0					2.0	2		2.0	
VA/NC	483	CVOW	196.0					196.0	196		196.0	
VA/NC	508	Kitty Hawk Wind North	66.0					66.0	66		66.0	
VA/NC	545	Total Energies	82.0					82.0			82.0	
VA/NC	546	Duke Energy	82.0					82.0			82.0	
VA/NC	508	Kitty Hawk South	100.0					100.0	100		100.0	
		Total VA/NC Leases	**528.0**	**-**	**-**		**-**	**528.0**	**364**	**-**	**528.0**	**-**
		Atlantic OCS Total	**5,698**	**3,242**	**1,954**		**3,242**	**5,692**	**5,528**	**3,101**	**5,692**	**3,242**
		Atlantic OCS Total Without NE Wind	***5,420***	***2,964***	***1,676***		***2,964***	***5,414***	***5,250***	***2,823***	***5,414***	***2,964***

			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)	11.6						-			
		Total State Waters	**11.6**						**-**			
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	555	555.0	-	-	555.0	555.0	555	555.0	555.0	555.0
MA/RI	486	Sunrise Wind	1,185	1,185.0	-	-	1,185.0	1,185.0	1,185	1,185.0	1,185.0	1,185.0
MA/RI	487	Revolution Wind	1,324	1,324.0	529.6	-	1,324.0	1,324.0	1,324	1,324.0	1,324.0	1,324.0
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	South Coast 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 Phase 1 and 2	318	318.2	318.2	-	318.2	318.2	318	318.2	318.2	318.2
MA/RI	500	Bay State Wind	110	110.0	110.0	-	110.0	110.0	110	110.0	110.0	110.0
MA/RI	522	Vineyard Northeast Wind	2,136	2,136.0	-	-	2,136.0	2,136.0	2,136	-	2,136.0	2,136.0
MA/RI	500, 487	Remainder of projects	170	170.0	170.0	-	170.0	170.0	170	-	170.0	170.0
		Total MA/RI Leases	**8,957**	**8,957.2**	**2,633.5**	**679.0**	**8,957.2**	**8,957.2**	**8,957**	**6,651.2**	**8,957.2**	**8,957.2**
		MA/RI Leases without NE Wind	***8,347.2***	***8,347.2***	***2,023.5***	***69.0***	***8,347.2***	***8,347.2***	***8,347***	***6,041.2***	***8,347.2***	***8,347.2***
NY/NJ	498	Ocean Wind	1,935.0					1,935.0	1,935		1,935.0	
NY/NJ	512	Empire Wind 1	368.0					368.0	368		368.0	
NY/NJ	512	Empire Wind 2	360.0					360.0	360		360.0	
NY/NJ	499	Atlantic Shores South	294.0					294.0	294		294.0	
NY/NJ	532	Ocean Wind 2	170.0					170.0	170		170.0	
NY/NJ	549	Atlantic Shores North	3,393.0					3,393.0	3,393		3,393.0	
NY/NJ	537	OW Ocean Winds East OCS	170.0					170.0	170		170.0	
NY/NJ	538	Attentive Energy	170.0					170.0	170		170.0	
NY/NJ	539	Bight Wind Holdings	170.0					170.0	170		170.0	
NY/NJ	541	Atlantic Shores Offshore Wind Bight	170.0					170.0	170		170.0	
NY/NJ	542	Invenergy Wind Offshore	170.0					170.0	170		170.0	
NY/NJ	544	Vineyard Mid-Atlantic	170.0					170.0	170		170.0	
		Total NY/NJ Leases	**7,540**	**-**	**-**		**-**	**7,540**	**7,540**	**-**	**7,540**	**-**
DE/MD	519	Skipjack	32.0					32.0	32		32.0	
DE/MD	490	US Wind	114.0					114.0	114		114.0	
DE/MD	482, 519	GSOE I and remainder	157.6					157.6	158		157.6	
		Total DE/MD Leases	**304**	**-**	**-**		**-**	**303.6**	**304**	**-**	**303.6**	**-**
VA/NC	497	CVOW Demonstration	11.0					11.0	11		11.0	
VA/NC	483	CVOW	2,635.0					2,635.0	2,635		2,635.0	
VA/NC	508	Kitty Hawk Wind North	407.0					407.0	407		407.0	
VA/NC	545	Total Energies	158.0					158.0			158.0	
VA/NC	546	Duke Energy	158.0					158.0			158.0	
VA/NC	508	Kitty Hawk South	1,284.0					1,284.0	1,284		1,284.0	
		Total VA/NC Leases	**4,653**	**-**	**-**		**-**	**4,653.0**	**4,337**	**-**	**4,653.0**	**-**
		Atlantic OCS Total	**21,465**	**8,957**	**2,633**	**679**	**8,957**	**21,454**	**21,138**	**6,651**	**21,454**	**8,957**
		Atlantic OCS Total Without NE Wind	***20,855***	***8,347***	***2,023***	***69***	***8,347***	***20,844***	***20,528***	***6,041***	***20,844***	***8,347***

			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	**NA**						-			
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	10	10.0	-	-	10.0	10.0	10	10.0	10.0	10.0
MA/RI	486	Sunrise Wind	25.2	25.2	-	-	25.2	25.2	25	25.2	25.2	25.2
MA/RI	487	Revolution Wind	48	48.0	19.2	-	48.0	48.0	48	48.0	48.0	48.0
MA/RI	534	New England Wind Phase 1	2	2.0	2.0	2.0	2.0	2.0	2	2.0	2.0	2.0
MA/RI	534	New England Wind Phase 2	5	5.0	5.0	5.0	5.0	5.0	5	5.0	5.0	5.0
MA/RI	521	South Coast Wind	247	247.0	82.3	-	247.0	247.0	247	247.0	247.0	247.0
MA/RI	520	Beacon Wind Phase 1 and 2	48.0	48.0	48.0	-	48.0	48.0	48	48.0	48.0	48.0
MA/RI	500	Bay State Wind	17.0	17.0	17.0	-	17.0	17.0	17	17.0	17.0	17.0
MA/RI	522	Vineyard Northeast Wind	130.0	130.0	-	-	130.0	130.0	130	-	130.0	130.0
MA/RI	500, 487	Remainder of projects	24.0	24.0	24.0	-	24.0	24.0	24	-	24.0	24.0
		Total MA/RI Leases	**591**	**591.2**	**232.5**	**42.0**	**591.2**	**591.2**	**591**	**437.2**	**591.2**	**591.2**
		MA/RI Leases without NE Wind	***584.2***	***584.2***	***225.5***	***35.0***	***584.2***	***584.2***	***584***	***430.2***	***584.2***	***584.2***
NY/NJ	498	Ocean Wind	94.0					94.0	94		94.0	
NY/NJ	512	Empire Wind 1	33.0					33.0	33		33.0	
NY/NJ	512	Empire Wind 2	32.0					32.0	32		32.0	
NY/NJ	499	Atlantic Shores South	294.0					294.0	294		294.0	
NY/NJ	532	Ocean Wind 2	24					24.0	24		24.0	
NY/NJ	549	Atlantic Shores North	393.0					393.0	393		393.0	
NY/NJ	537	OW Ocean Winds East OCS	24.0					24.0	24		24.0	
NY/NJ	538	Attentive Energy	24.0					24.0	24		24.0	
NY/NJ	539	Bight Wind Holdings	24.0					24.0	24		24.0	
NY/NJ	541	Atlantic Shores Offshore Wind Bight	24.0					24.0	24		24.0	
NY/NJ	542	Invenergy Wind Offshore	24.0					24.0	24		24.0	
NY/NJ	544	Vineyard Mid-Atlantic	24.0					24.0	24		24.0	
		Total NY/NJ Leases	**1,014**	**-**	**-**		**-**	**1,014**	**1,014**	**-**	**1,014**	**-**
DE/MD	519	Skipjack	5.0					5.0	5		5.0	
DE/MD	490	US Wind	17.0					17.0	17		17.0	
DE/MD	482, 519	GSOE I and remainder	4.8					4.8	5		4.8	
		Total DE/MD Leases	**27**	**-**	**-**		**-**	**26.8**	**27**	**-**	**26.8**	**-**
VA/NC	497	CVOW Demonstration	3.0					3.0	3		3.0	
VA/NC	483	CVOW	149.0					149.0	149		149.0	
VA/NC	508	Kitty Hawk Wind North	32.0					32.0	32		32.0	
VA/NC	545	Total Energies	24.0					24.0			24.0	
VA/NC	546	Duke Energy	24.0					24.0			24.0	
VA/NC	508	Kitty Hawk South	49.0					49.0	49		49.0	
		Total VA/NC Leases	**281**	**-**	**-**		**-**	**281.0**	**233**	**-**	**281.0**	**-**
		Atlantic OCS Total	**#VALUE!**	**591**	**233**	**42**	**591**	**1,913**	**1,865**	**437**	**1,913**	**591**
		Atlantic OCS Total Without NE Wind	***#VALUE!***	***584***	***226***	***35***	***584***	***1,906***	***1,858***	***430***	***1,906***	***584***

			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)	0.5						-			
		Total State Waters	**0.5**						**-**			
MA/RI	501	Vineyard Wind 1	122	122.0	122.0	-	122.0	122.0	122	122.0	122.0	122.0
MA/RI	517	South Fork Wind	821	821.0	-	-	821.0	821.0	821	821.0	821.0	821.0
MA/RI	486	Sunrise Wind	260.3	260.3	NA	-	260.3	260.3	260	260.3	260.3	260.3
MA/RI	487	Revolution Wind	21	21.0	NA	-	21.0	21.0	21	21.0	21.0	21.0
MA/RI	534	New England Wind Phase 1	143	143.0	143.0	143.0	143.0	143.0	143	143.0	143.0	143.0
MA/RI	534	New England Wind Phase 2	199	199.0	199.0	199.0	199.0	199.0	199	199.0	199.0	199.0
MA/RI	521	South Coast Wind	442	442.0	147.3	-	442.0	442.0	442	442.0	442.0	442.0
MA/RI	520	Beacon Wind Phase 1 and 2	18	18.0	18.0	-	18.0	18.0	18	18.0	18.0	18.0
MA/RI	500	Bay State Wind	442	442.0	442.0	-	442.0	442.0	442	442.0	442.0	442.0
MA/RI	522	Vineyard Northeast Wind	896	896.0	-	-	896.0	896.0	896	-	896.0	896.0
MA/RI	500, 487	Remainder of projects	498	497.6	497.6	-	497.6	497.6	498	-	497.6	497.6
		Total MA/RI Leases	**3,862**	**3,861.9**	**1,568.9**	**342.0**	**3,861.9**	**3,861.9**	**3,862**	**2,468.3**	**3,861.9**	**3,861.9**
		MA/RI Leases without NE Wind	***3,519.9***	***3,519.9***	***1,226.9***	***-***	***3,519.9***	***3,519.9***	***3,520***	***2,126.3***	***3,519.9***	***3,519.9***
NY/NJ	498	Ocean Wind	19.0					19.0	19		19.0	
NY/NJ	512	Empire Wind 1	9.0					9.0	9		9.0	
NY/NJ	512	Empire Wind 2	9.0					9.0	9		9.0	
NY/NJ	499	Atlantic Shores South	714.0					714.0	714		714.0	
NY/NJ	532	Ocean Wind 2	292.8					292.8	293		292.8	
NY/NJ	549	Atlantic Shores North	416.0					416.0	416		416.0	
NY/NJ	537	OW Ocean Winds East OCS	292.8					292.8	293		292.8	
NY/NJ	538	Attentive Energy	292.8					292.8	293		292.8	
NY/NJ	539	Bight Wind Holdings	292.8					292.8	293		292.8	
NY/NJ	541	Atlantic Shores Offshore Wind Bight	292.8					292.8	293		292.8	
NY/NJ	542	Invenergy Wind Offshore	292.8					292.8	293		292.8	
NY/NJ	544	Vineyard Mid-Atlantic	292.8					292.8	293		292.8	
		Total NY/NJ Leases	**3,217**	**-**	**-**		**-**	**3,217**	**3,217**	**-**	**3,217**	**-**
DE/MD	519	Skipjack	58.6					58.6	59		58.6	
DE/MD	490	US Wind	212.2					212.2	212		212.2	
DE/MD	482, 519	GSOE I and remainder	335.8					335.8	336		335.8	
		Total DE/MD Leases	**607**	**-**	**-**		**-**	**606.6**	**607**	**-**	**606.6**	**-**
VA/NC	497	CVOW Demonstration	0.6					0.6	1		0.6	
VA/NC	483	CVOW	49.0					49.0	49		49.0	
VA/NC	508	Kitty Hawk Wind North	2.0					2.0	2		2.0	
VA/NC	545	Total Energies	4.7					4.7			4.7	
VA/NC	546	Duke Energy	4.7					4.7			4.7	
VA/NC	508	Kitty Hawk South	9.0					9.0	9		9.0	
		Total VA/NC Leases	**70**	**-**	**-**		**-**	**70.0**	**61**	**-**	**70.0**	**-**
		Atlantic OCS Total	**7,756**	**3,862**	**1,569**	**342**	**3,862**	**7,755**	**7,746**	**2,468**	**7,755**	**3,862**
		Atlantic OCS Total Without NE Wind	***7,414***	***3,520***	***1,227***	***-***	***3,520***	***7,413***	***7,404***	***2,126***	***7,413***	***3,520***

			Inter-array + Inter-link Cable Footprint/Seabed Disruption (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)	4						-			
		Total State Waters	**4**						-			
MA/RI	501	Vineyard Wind 1	129.0	129.0	129.0	-	129.0	129.0	129	129.0	129.0	129.0
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	2,150.0	2,150.0	-	-	2,150.0	2,150.0	2,150	2,150.0	2,150.0	2,150.0
MA/RI	487	Revolution Wind	2,471.0	2,471.0	988.4	-	2,471.0	2,471.0	2,471	2,471.0	2,471.0	2,471.0
MA/RI	534	New England Wind Phase 1	222.0	222.0	222.0	222.0	222.0	222.0	222	222.0	222.0	222.0
MA/RI	534	New England Wind Phase 2	321.0	321.0	321.0	321.0	321.0	321.0	321	321.0	321.0	321.0
MA/RI	521	South Coast 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 Phase 1 and 2	1,925.6	1,925.6	1,925.6	-	1,925.6	1,925.6	1,926	1,925.6	1,925.6	1,925.6
MA/RI	500	Bay State Wind	226.0	226.0	226.0	-	226.0	226.0	226	226.0	226.0	226.0
MA/RI	522	Vineyard Northeast Wind	1,176.0	1,176.0	-	-	1,176.0	1,176.0	1,176	-	1,176.0	1,176.0
MA/RI	500, 487	Remainder of projects	1,206.0	1,206.0	1,206.0	-	1,206.0	1,206.0	1,206	-	1,206.0	1,206.0
		Total MA/RI Leases	**11,575**	**11,574.6**	**5,487.3**	**543.0**	**11,574.6**	**11,574.6**	**11,575**	**9,192.6**	**11,574.6**	**11,574.6**
		MA/RI Leases without NE Wind	***11,031.6***	***11,031.6***	***4,944.3***	***-***	***11,031.6***	***11,031.6***	***11,032***	***8,649.6***	***11,031.6***	***11,031.6***
NY/NJ	498	Ocean Wind	1,850.0					1,850.0	1,850		1,850.0	
NY/NJ	512	Empire Wind 1	534.0					534.0	534		534.0	
NY/NJ	512	Empire Wind 2	633.0					633.0	633		633.0	
NY/NJ	499	Atlantic Shores South	282.0					282.0	282		282.0	
NY/NJ	532	Ocean Wind 2	887.0					887.0	887		887.0	
NY/NJ	549	Atlantic Shores North	2,162.0					2,162.0	2,162		2,162.0	
NY/NJ	537	OW Ocean Winds East OCS	655.0					655.0	655		655.0	
NY/NJ	538	Attentive Energy	815.0					815.0	815		815.0	
NY/NJ	539	Bight Wind Holdings	1,182.0					1,182.0	1,182		1,182.0	
NY/NJ	541	Atlantic Shores Offshore Wind Bight	759.0					759.0	759		759.0	
NY/NJ	542	Invenergy Wind Offshore	791.0					791.0	791		791.0	
NY/NJ	544	Vineyard Mid-Atlantic	831.0					831.0	831		831.0	
		Total NY/NJ Leases	**11,381**	**-**	**-**		**-**	**11,381**	**11,381**	**-**	**11,381**	**-**
DE/MD	519	Skipjack	136.0					136.0	136		136.0	
DE/MD	490	US Wind	998.0					998.0	998		998.0	
DE/MD	482, 519	GSOE I and remainder	766.8					766.8	767		766.8	
		Total DE/MD Leases	**1,901**	**-**	**-**		**-**	**1,900.8**	**1,901**	**-**	**1,900.8**	**-**
VA/NC	497	CVOW Demonstration	5.0					5.0	5		5.0	
VA/NC	483	CVOW	2,394.0					2,394.0	2,394		2,394.0	
VA/NC	508	Kitty Hawk Wind North	5,931.0					5,931.0	5,931		5,931.0	
VA/NC	545	Total Energies	4,631.0					4,631.0			4,631.0	
VA/NC	546	Duke Energy	4,631.0					4,631.0			4,631.0	
VA/NC	508	Kitty Hawk South	7,957.0					7,957.0	7,957		7,957.0	
		Total VA/NC Leases	**25,549**	**-**	**-**		**-**	**25,549.0**	**16,287**	**-**	**25,549.0**	**-**
		Atlantic OCS Total	**50,409**	**11,575**	**5,487**	**543**	**11,575**	**50,405**	**41,143**	**9,193**	**50,405**	**11,575**
		Atlantic OCS Total Without NE Wind	***49,866***	***11,032***	***4,944***	***-***	***11,032***	***49,862***	***40,600***	***8,650***	***49,862***	***11,032***

			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)	NA								
		Total State Waters	**NA**								
MA/RI	501	Vineyard Wind 1	22,491.0	22,491.0	22,491.0	-	22,491.0	22,491.0	22,491.0	22,491.0	22,491.0
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	129.0	129.0	-	-	129.0	129.0	129.0	129.0	129.0
MA/RI	487	Revolution Wind	41.8	41.8	16.7	-	41.8	41.8	41.8	41.8	41.8
MA/RI	534	New England Wind Phase 1	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
MA/RI	534	New England Wind Phase 2	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
MA/RI	521	South Coast Wind	122.0	122.0	40.7	-	122.0	122.0	122.0	122.0	122.0
MA/RI	520	Beacon Wind Phase 1 and 2	164.0	164.0	164.0	-	164.0	164.0	164.0	164.0	164.0
MA/RI	500	Bay State Wind	137.0	137.0	137.0	-	137.0	137.0	137.0	137.0	137.0
MA/RI	522	Vineyard Northeast Wind	21.0	21.0	-	-	21.0	21.0	-	21.0	21.0
MA/RI	500, 487	Remainder of projects	-	-	-	-	-	-	-	-	-
		Total MA/RI Leases	**23,140**	**23,140.0**	**22,873.4**	**24.0**	**23,140.0**	**23,140.0**	**23,119.0**	**23,140.0**	**23,140.0**
		MA/RI Leases without NE Wind	***23,116***	***23,116.0***	***22,849.4***	***-***	***23,116.0***	***23,116.0***	***23,095.0***	***23,116.0***	***23,116.0***
NY/NJ	498	Ocean Wind	77					77.0		77.0	
NY/NJ	512	Empire Wind 1	26.0					26.0		26.0	
NY/NJ	512	Empire Wind 2	32.0					32.0		32.0	
NY/NJ	499	Atlantic Shores South	301.0					301.0		301.0	
NY/NJ	532	Ocean Wind 2	-					-		-	
NY/NJ	549	Atlantic Shores North	301.0					301.0		301.0	
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	Vineyard Mid-Atlantic	-					-		-	
		Total NY/NJ Leases	**737**	**-**	**-**		**-**	**737**	**-**	**737**	**-**
DE/MD	519	Skipjack	-					-		-	
DE/MD	490	US Wind	-					-		-	
DE/MD	482, 519	GSOE I and remainder	-					-		-	
		Total DE/MD Leases	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**
VA/NC	497	CVOW Demonstration	-					-		-	
VA/NC	483	CVOW	-					-		-	
VA/NC	508	Kitty Hawk Wind North	-					-		-	
VA/NC	545	Total Energies	-					-		-	
VA/NC	546	Duke Energy	-					-		-	
VA/NC	508	Kitty Hawk South	-					-		-	
		Total VA/NC Leases	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**
		Atlantic OCS Total	**#VALUE!**								
		Atlantic OCS Total Without NE Wind	***#VALUE!***								

			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	**NA**											
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	41,208	41,208	-	41,208	41,208	41,208	27	-	-	27	27	27
MA/RI	486	Sunrise Wind	322,796	322,796	-	322,796	322,796	322,796	13,208	11,262	-	13,208	13,208	13,208
MA/RI	487	Revolution Wind	343,400	343,400	-	343,400	343,400	343,400	-	-	-	-	-	-
MA/RI	534	New England Wind Phase 1	314,464	314,464	314,464	314,464	314,464	314,464	4,228	4,228	4,228	4,228	4,228	4,228
MA/RI	534	New England Wind Phase 2	314,464	314,464	314,464	314,464	314,464	314,464	9,510	9,510	9,510	9,510	9,510	9,510
MA/RI	521	South Coast Wind	73,500	73,500	-	73,500	73,500	73,500	1,500	1,500	-	1,500	1,500	1,500
MA/RI	520	Beacon Wind Phase 1 and 2	163,936	163,936		163,936	50,302	163,936	26,416	8,105		26,416	8,105	26,416
MA/RI	500	Bay State Wind	322,796	322,796	-	322,796	29,090	322,796	50	4,687	-	50	4,687	50
MA/RI	522	Vineyard Northeast Wind	1268000	1,268,000		1,268,000	-	1,268,000	14,792	-		14,792	-	14,792
MA/RI	500, 487	Remainder of projects	369,410	369,410		369,410	36,060	369,410	12,049	5,811		12,049	5,811	12,049
		Total MA/RI Leases	**3,576,274**	**3,576,274**	**628,928**	**3,576,274**	**1,567,584**	**3,576,274**	**81,826**	**45,149**	**13,738**	**81,826**	**47,123**	**81,826**
		MA/RI Leases without NE Wind	***2,947,346***	***2,947,346***	***-***	***2,947,346***	***938,656***	***2,947,346***	***68,088***	***31,411***	***-***	***68,088***	***33,385***	***68,088***
NY/NJ	498	Ocean Wind	39,690	-	-	39,690	-	39,690	-	-	-	-	-	-
NY/NJ	512	Empire Wind 1	49,704	-	-	49,704	-	49,704	-	-	-	-	-	-
NY/NJ	512	Empire Wind 2	78,480	-	-	78,480	-	78,480	-	-	-	-	-	-
NY/NJ	499	Atlantic Shores South	820,000	-	-	820,000	-	820,000	10,300	-	-	10,300	-	10,300
NY/NJ	532	Ocean Wind 2	330,561	-	-	330,561	-	330,561	2,992	-	-	2,992	-	2,992
NY/NJ	549	Atlantic Shores North	643,700	-	-	643,700	-	643,700	9,150	-	-	9,150	-	9,150
NY/NJ	537	OW Ocean Winds East OCS	242,613	-	-	242,613	-	242,613	2,992	-	-	2,992	-	2,992
NY/NJ	538	Attentive Energy	303,267	-	-	303,267	-	303,267	2,992	-	-	2,992	-	2,992
NY/NJ	539	Bight Wind Holdings	439,736	-	-	439,736	-	439,736	4,488	-	-	4,488	-	4,488
NY/NJ	541	Atlantic Shores Offshore Wind Bight	282,038	-	-	282,038	-	282,038	2,992	-	-	2,992	-	2,992
NY/NJ	542	Invenergy Wind Offshore	294,169	-	-	294,169	-	294,169	2,992	-	-	2,992	-	2,992
NY/NJ	544	Vineyard Mid-Atlantic	309,332	-	-	309,332	-	309,332	2,992	-	-	2,992	-	2,992
		Total NY/NJ Leases	**3,833,290**	**-**	**-**	**3,833,290**	**-**	**3,833,290**	**41,890**	**-**	**-**	**41,890**	**-**	**41,890**
DE/MD	519	Skipjack	48,523	-	-	48,523	-	48,523	1,496	-	-	1,496	-	1,496
DE/MD	490	US Wind	366,953	-	-	366,953	-	366,953	5,985	-	-	5,985	-	5,985
DE/MD	482, 519	GSOE I and remainder	285,071	-	-	285,071	-	285,071	2,992	-	-	2,992	-	2,992
		Total DE/MD Leases	**700,547**	**-**	**-**	**700,547**	**-**	**700,547**	**10,473**	**-**	**-**	**10,473**	**-**	**10,473**
VA/NC	497	CVOW Demonstration	846						-					
VA/NC	483	CVOW	86,715	-	-	86,715	-	86,715	-	-	-	-	-	-
VA/NC	508	Kitty Hawk Wind North	29,165	-	-	29,165	-	29,165	46	-	-	46	-	46
VA/NC	545	Total Energies	27,267	-	-	27,267	-	27,267	23	-	-	23	-	23
VA/NC	546	Duke Energy	27,268	-	-	27,268	-	27,268	23	-	-	23	-	23
VA/NC	508	Kitty Hawk South	51,144	-	-	51,144	-	51,144	93	-	-	93	-	93
		Total VA/NC Leases	**222,405**	**-**	**-**	**221,559**	**-**	**221,559**	**185**	**-**	**-**	**185**	**-**	**185**
		Atlantic OCS Total	**#VALUE!**	**3,576,274**	**628,928**	**8,331,670**	**1,567,584**	**8,331,670**	**134,374**	**45,149**	**13,738**	**134,374**	**47,123**	**134,374**
		Atlantic OCS Total Without NE Wind	***#VALUE!***	***2,947,346***	***-***	***7,702,742***	***938,656***	***7,702,742***	***120,636***	***31,411***	***-***	***120,636***	***33,385***	***120,636***

Region	Lease	Name	Total Volume of Oils and Lubricants in WTGs (gallons)						Total Oils and Lubricants 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	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	69,732	-	-	69,732	69,732	69,732	80,045	-	-	80,045	80,045	80,045	80,045
MA/RI	486	Sunrise Wind	208,680	177,927	-	208,680	208,680	208,680	109,570	93,423	-	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	498,604	498,604	498,604	498,604	498,604	498,604	263,650	263,650	263,650	263,650	263,650	263,650	263,650
MA/RI	534	New England Wind Phase 2	839,608	839,608	839,608	839,608	839,608	839,608	533,334	533,334	533,334	533,334	533,334	533,334	533,334
MA/RI	521	South Coast Wind	433,650	433,650	-	433,650	433,650	433,650	755,000	755,000	-	755,000	755,000	755,000	755,000
MA/RI	520	Beacon Wind Phase 1 and 2	830,736	254,902		830,736	254,902	830,736	172,002	52,777		172,002	172,002	52,777	172,002
MA/RI	500	Bay State Wind	310,200	147,413	-	310,200	147,413	310,200	160,000	30,522	-	160,000	160,000	30,522	160,000
MA/RI	522	Vineyard Northeast Wind	1,056,640	-		1,056,640	-	1,056,640	947016	-		947,016	947,016	-	947,016
MA/RI	500, 487	Remainder of projects	571,497	182,731		571,497	182,731	571,497	521,576	37,834		521,576	521,576	37,834	521,576
		Total MA/RI Leases	**5,532,647**	**2,956,695**	**1,338,212**	**5,532,647**	**3,348,621**	**5,532,647**	**3,824,890**	**1,908,821**	**796,984**	**3,824,890**	**3,824,890**	**2,145,429**	**3,824,890**
		MA/RI Leases without NE Wind	***4,194,435***	***1,618,483***	***-***	***4,194,435***	***2,010,409***	***4,194,435***	***3,027,906***	***1,111,837***	***-***	***3,027,906***	***3,027,906***	***1,348,445***	***3,027,906***
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	285,684	-	-	285,684	-	285,684	158,503	-	-	158,503	158,503	-	158,503
NY/NJ	512	Empire Wind 2	451,080	-	-	451,080	-	451,080	158,503	-	-	158,503	158,503	-	158,503
NY/NJ	499	Atlantic Shores South	606,200	-	-	606,200	-	606,200	370,050	-	-	370,050	370,050	-	370,050
NY/NJ	532	Ocean Wind 2	417,714	-	-	417,714	-	417,714	185,452	-	-	185,452	185,452	-	185,452
NY/NJ	549	Atlantic Shores North	530,817	-	-	530,817	-	530,817	557,850	-	-	557,850	557,850	-	557,850
NY/NJ	537	OW Ocean Winds East OCS	306,579	-	-	306,579	-	306,579	185,452	-	-	185,452	185,452	-	185,452
NY/NJ	538	Attentive Energy	383,224	-	-	383,224	-	383,224	185,452	-	-	185,452	185,452	-	185,452
NY/NJ	539	Bight Wind Holdings	555,675	-	-	555,675	-	555,675	278,177	-	-	278,177	278,177	-	278,177
NY/NJ	541	Atlantic Shores Offshore Wind Bight	356,398	-	-	356,398	-	356,398	185,452	-	-	185,452	185,452	-	185,452
NY/NJ	542	Invenergy Wind Offshore	371,727	-	-	371,727	-	371,727	185,452	-	-	185,452	185,452	-	185,452
NY/NJ	544	Vineyard Mid-Atlantic	390,888	-	-	390,888	-	390,888	185,452	-	-	185,452	185,452	-	185,452
		Total NY/NJ Leases	**4,843,950**	**-**	**-**	**4,843,950**	**-**	**4,843,950**	**2,874,502**	**-**	**-**	**2,874,502**	**2,874,502**	**-**	**2,874,502**
DE/MD	519	Skipjack	61,316	-	-	61,316	-	61,316	92,726	-	-	92,726	92,726	-	92,726
DE/MD	490	US Wind	463,701	-	-	463,701	-	463,701	370,903	-	-	370,903	370,903	-	370,903
DE/MD	482, 519	GSOE I and remainder	360,231	-	-	360,231	-	360,231	185,452	-	-	185,452	185,452	-	185,452
		Total DE/MD Leases	**885,248**	**-**	**-**	**885,248**	**-**	**885,248**	**649,081**	**-**	**-**	**649,081**	**649,081**	**-**	**649,081**
VA/NC	497	CVOW Demonstration	7,660						-				-		
VA/NC	483	CVOW	430,664	-	-	430,664	-	430,664	258,300	-	-	258,300	258,300	-	258,300
VA/NC	508	Kitty Hawk Wind North	229,800	-	-	229,800	-	229,800	61,780	-	-	61,780	61,780	-	61,780
VA/NC	545	Total Energies	181,219	-	-	181,219	-	181,219	94,533	-	-	94,533		-	94,533
VA/NC	546	Duke Energy	180,939	-	-	180,939	-	180,939	94,533	-	-	94,533		-	94,533
VA/NC	508	Kitty Hawk South	447,507	-	-	447,507	-	447,507	247,117	-	-	247,117	247,117	-	247,117
		Total VA/NC Leases	**1,477,789**	**-**	**-**	**1,470,129**	**-**	**1,470,129**	**756,263**	**-**	**-**	**756,263**	**567,197**	**-**	**756,263**
		Atlantic OCS Total	**12,739,634**	**2,956,695**	**1,338,212**	**12,731,974**	**3,348,621**	**12,731,974**	**8,104,736**	**1,908,821**	**796,984**	**8,104,736**	**7,915,670**	**2,145,429**	**8,104,736**
		Atlantic OCS Total Without NE Wind	***11,401,422***	***1,618,483***	***-***	***11,393,762***	***2,010,409***	***11,393,762***	***7,307,752***	***1,111,837***	***-***	***7,307,752***	***7,118,686***	***1,348,445***	***7,307,752***

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	**NA**				**-**			**NA**				**-**		
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	9,516	-	-	9,516	9,516	9,516	9,516	52,834	-	-	52,834	52,834	52,834	52,834
MA/RI	486	Sunrise Wind	-	-	-	-	-	-	-	24,304	20,722	-	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	98,272	98,272	98,272	98,272	98,272	98,272	98,272	16,402	16,402	16,402	16,402	16,402	16,402	16,402
MA/RI	534	New England Wind Phase 2	162,712	162,712	162,712	162,712	162,712	162,712	162,712	24,603	24,603	24,603	24,603	24,603	24,603	24,603
MA/RI	521	South Coast Wind	132,300	132,300	-	132,300	132,300	132,300	132,300	40,000	40,000	-	40,000	40,000	40,000	40,000
MA/RI	520	Beacon Wind Phase 1 and 2	149,084	45,745	-	149,084	149,084	45,745	149,084	39,872	12,234	-	39,872	39,872	12,234	39,872
MA/RI	500	Bay State Wind	75,200	26,455		75,200	75,200	26,455	75,200		7,075			-	7,075	
MA/RI	522	Vineyard Northeast Wind	-	-		-	-	-	-		-			-	-	
MA/RI	500, 487	Remainder of projects	90,506	32,793		90,506	90,506	32,793	90,506		8,770			-	8,770	
		Total MA/RI Leases	**876,190**	**586,906**	**260,984**	**876,190**	**876,190**	**666,393**	**876,190**	**309,379**	**147,935**	**41,005**	**309,379**	**309,379**	**297,587**	**309,379**
		MA/RI Leases without NE Wind	***615,206***	***325,922***	***-***	***615,206***	***615,206***	***405,409***	***615,206***	***268,374***	***106,930***	***-***	***268,374***	***268,374***	***256,582***	***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 South	80,000	-	-	80,000	80,000	-	80,000	75,000	-	-	75,000	75,000	-	75,000
NY/NJ	532	Ocean Wind 2	44,677	-	-	44,677	44,677	-	44,677	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	32,790	-	-	32,790	32,790	-	32,790	190,849	-	-	190,849	190,849	-	190,849
NY/NJ	538	Attentive Energy	40,988	-	-	40,988	40,988	-	40,988	145,563	-	-	145,563	145,563	-	145,563
NY/NJ	539	Bight Wind Holdings	59,432	-	-	59,432	59,432	-	59,432	135,859	-	-	135,859	135,859	-	135,859
NY/NJ	541	Atlantic Shores Offshore Wind Bight	38,119	-	-	38,119	38,119	-	38,119	153,650	-	-	153,650	153,650	-	153,650
NY/NJ	542	Invenergy Wind Offshore	39,758	-	-	39,758	39,758	-	39,758	152,033	-	-	152,033	152,033	-	152,033
NY/NJ	544	Vineyard Mid-Atlantic	41,807	-	-	41,807	41,807	-	41,807	101,894	-	-	101,894	101,894	-	101,894
		Total NY/NJ Leases	**518,085**	**-**	**-**	**518,085**	**518,085**	**-**	**518,085**	**1,391,300**	**-**	**-**	**1,391,300**	**1,391,300**	**-**	**1,391,300**
DE/MD	519	Skipjack	6,558	-	-	6,558	6,558	-	6,558	2,848	-	-	2,848	2,848	-	2,848
DE/MD	490	US Wind	49,595	-	-	49,595	49,595	-	49,595	11,392	-	-	11,392	11,392	-	11,392
DE/MD	482, 519	GSOE I and remainder	38,529	-	-	38,529	38,529	-	38,529	8,544	-	-	8,544	8,544	-	8,544
		Total DE/MD Leases	**94,682**	**-**	**-**	**94,682**	**94,682**	**-**	**94,682**	**22,784**	**-**	**-**	**22,784**	**22,784**	**-**	**22,784**
VA/NC	497	CVOW Demonstration	1,586				-			-				-		
VA/NC	483	CVOW	-	-	-	-	-	-	-	8,544	-	-	8,544	8,544	-	8,544
VA/NC	508	Kitty Hawk Wind North	47,580	-	-	47,580	47,580	-	47,580	8,544	-	-	8,544	8,544	-	8,544
VA/NC	545	Total Energies	23,563	-	-	23,563		-	23,563	9,771	-	-	9,771		-	9,771
VA/NC	546	Duke Energy	23,563	-	-	23,563		-	23,563	9,809	-	-	9,809		-	9,809
VA/NC	508	Kitty Hawk South	95,894	-	-	95,894	95,894	-	95,894	13,226	-	-	13,226	13,226	-	13,226
		Total VA/NC Leases	**192,186**	**-**	**-**	**190,600**	**143,474**	**-**	**190,600**	**49,895**	**-**	**-**	**49,895**	**30,314**	**-**	**49,895**
		Atlantic OCS Total	**#VALUE!**	**586,906**	**260,984**	**1,679,557**	**1,632,431**	**666,393**	**1,679,557**	**#VALUE!**	**147,935**	**41,005**	**1,773,358**	**1,753,777**	**297,587**	**1,773,358**
		Atlantic OCS Total Without NE Wind	***#VALUE!***	***325,922***	***-***	***1,418,573***	***1,371,447***	***405,409***	***1,418,573***	***#VALUE!***	***106,930***	***-***	***1,732,353***	***1,712,772***	***256,582***	***1,732,353***

Region	Lease	Name																
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)	586.0	25.7	101.2	37.2	NA	0.4	NA	42,940.0	21.4	0.8	2.8	1.4	NA	NA		1,572.0
		Total State Waters																
MA/RI	501	Vineyard Wind 1	4,961.0	122.0	1,116.0	172.0	125.0	38.0	-	250,920.0	71.0	2.0	18.0	12.3	12.0	0.9	-	342,121.0
MA/RI	517	South Fork Wind	521.5	11.7	80.7	17.5	16.9	3.6	-	97,026.0	92.9	1.9	17.3	3.0	2.8	0.5	-	18,894.0
MA/RI	486	Sunrise Wind	2,092.8	49.1	869.4	38.6	38.6	2.1	-	230,504.0	183.8	4.3	76.3	3.4	3.4	0.2	-	20,242.0
MA/RI	487	Revolution Wind	22,395.4	80.6	5,468.3	757.7	732.1	69.3	-	1,702,429.0	322.6	12.4	93.3	12.3	12.0	0.9	-	73,349.0
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	South Coast Wind	39,965.0	1,590.0	8,284.0	2,897.0	1,566.0	1,556.0	-	2,633,405.0	729.0	13.0	180.0	24.0	19.0	28.0	-	48,898.0
MA/RI	520	Beacon Wind Phase 1 and 2	17,677.1	729.6	1,757.7	290.4	269.9	507.5	-	1,012,652.4	124.4	5.0	23.6	3.4	3.2	5.0	-	32,068.8
MA/RI	500	Bay State Wind	12,304.3	148.8	2,936.9	451.6	74.5	61.0	-	304,762.0	249.9	6.7	64.8	11.7	11.4	1.0	-	21,252.0
MA/RI	522	Vineyard Northeast Wind	17,298.0	390.0	4,087.0	635.0	613.0	133.1	-	1,246,612.0	773.0	14.0	196.0	26.0	25.0	2.6	-	86,780.0
MA/RI	500, 487	Remainder of projects	15,222.7	396.6	3,239.3	679.0	464.7	286.8	-	976,299.7	337.8	7.6	88.3	12.6	11.7	4.7	-	80,433.5
		Total MA/RI Leases																
		MA/RI Leases without NE Wind																
NY/NJ	498	Ocean Wind																
NY/NJ	512	Empire Wind 1																
NY/NJ	512	Empire Wind 2																
NY/NJ	499	Atlantic Shores South																
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	Vineyard Mid-Atlantic																
		Total NY/NJ Leases																
DE/MD	519	Skipjack																
DE/MD	490	US Wind																
DE/MD	482, 519	GSOE I and remainder																
		Total DE/MD Leases																
VA/NC	497	CVOW Demonstration																
VA/NC	483	CVOW																
VA/NC	508	Kitty Hawk Wind North																
VA/NC	545	Total Energies																
VA/NC	546	Duke Energy																
VA/NC	508	Kitty Hawk South																
		Total VA/NC Leases																
		Atlantic OCS Total																
		Atlantic OCS Total Without NE Wind																

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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	SouthCoast 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 July 12, 2023)[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				62							
South Fork Wind, part of OCS-A 0517				12							
Revolution Wind, part of OCS-A 0486					67						
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					95						
South Coast Wind, part of OCS-A 0521					149						
Beacon Wind, Phase 1 and 2					164						
Bay State Wind						96					
Vineyard Northeast Wind						160					
Future Project(s) in Massachusetts/Rhode Island Region						119					
Estimated Annual Massachusetts/Rhode Island Construction:	*0*	*0*	*0*	*74*	*537*	*443*	*0*	*0*	*0*	*0*	*0*
Estimated Operations Total:	*0*	*0*	*0*	*0*	*74*	*611*	*1,054*	*1,054*	*1,054*	*1,054*	*1,054*
New York/New Jersey Region											
Ocean Wind, part of OCS-A 0498					101						
Empire Wind, part of OCS-A 0512					58						
Empire Wind Phase 2, part of OCS-A 0512					91						
Atlantic Shores South, part of OCS-A 0499						210					
Ocean Wind 2, part of OCS-A 0532							111				
Atlantic Shores North, part of OCS-A 0549							160–165				
OW Ocean Winds East OCS, part of OCS-A 0537							82				
Attentive Energy, part of OCS-A 0538							102				
Bight Wind Holdings, part of OCS-A 0539							148				
Atlantic Shores Offshore Wind Bight, part of OCS-A 0541							95				
Invenergy Wind Offshore, part of OCS-A 0542							99				
Vineyard Mid-Atlantic, part of OCS-A 0544							104				
Estimated Annual New York/New Jersey Construction:	*0*	*0*	*0*	*0*	*250*	*210*	*906*	*0*	*0*	*0*	*0*
Estimated Operations Total:	*0*	*0*	*0*	*0*	*0*	*250*	*460*	*1,366*	*1,366*	*1,366*	*1,366*

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						96					
OCS-A 0519 remainder											
Estimated Annual Delaware/Maryland Construction:	*0*	*0*	*0*	*0*	*142*	*96*	*0*	*0*	*0*	*0*	*0*
Estimated Operations Total:	*0*	*0*	*0*	*0*	*0*	*142*	*238*	*238*	*238*	*238*	*238*
Virginia/North Carolina Region											
Coastal Virginia Offshore Wind, OCS-A 0497	2										
Coastal Virginia Offshore Wind, part of OCS-A 0483				205							
Kitty Hawk Wind North, part of OCS-A 0508								70			
Total Energies, part of OCS-A 0545										65	
Duke Energy, part of OCS-A 0546										65	
Kitty Hawk South, part of OCS-A 0508								123			
Estimated Annual Virginia Construction:	2	0	0	205	0	0	0	293	0	130	0
Estimated Operations Total:	2	2	2	2	207	207	207	207	500	500	630
Estimated Annual Total Construction:	**2**	**0**	**0**	**279**	**929**	**749**	**906**	**293**	**0**	**130**	**0**
Estimated Operations Total:	**7**	**7**	**7**	**7**	**286**	**1,215**	**1,964**	**2,870**	**3,163**	**3,163**	**3,293**

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 New Bedford Foss Marine Terminal (formerly the Eversource/Sprague Oil site) is a 30-acre site in New Bedford, Massachusetts, being redeveloped to support offshore wind projects. The terminal will provide areas for storage and laydown, berths for tug and barge, crew transfer, and service operation vessels, as well as associated office and support services (Foss Maritime 2022).

- 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). Due to the continued development and approval of offshore wind projects in the United States, these improvements are reasonably foreseeable.
- 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). Due to the continued development and approval of offshore wind projects in the United States, these improvements are reasonably foreseeable.
- 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. Due to the continued development and approval of offshore wind projects in the United States, these improvements are reasonably foreseeable.

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).
- 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. 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 2023). 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 2023).

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 between 2017 and 2019 (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). 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). 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. 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) • A City Master Plan: New Bedford 2020 (Vanasse Hangen Brustlin, Inc 2010) • Town of North Kingstown Comprehensive Plan Update 2008 (Town of North Kingstown 2008) • Washington County Transfer of Development Rights Study (Horsely Witten Group 2012) • 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 USACE, the 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). 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). 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). 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. 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). 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). 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. New York State proposed port improvements include upgrades to create five dedicated port facilities for offshore wind, including the following: • The nation's first offshore wind tower manufacturing facility, to be built at the Port of Albany; • An offshore wind turbine staging facility and operations and maintenance hub to be established at the South Brooklyn Marine Terminal; • Increasing the use of the Port of Coeymans for turbine foundation manufacturing; and • 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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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
NASEM	National Academies of Sciences, Engineering, and Medicine
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, 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. Furthermore, NEPA does not require agencies to undertake new and technical research to inform their analyses (Code of Federal Regulations, Title 40, Section 1502.23 [40 CFR § 1502.23]). 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

The analysis using all available and complete information regarding proposed Project impacts on air quality is provided in Section G.2.1 in EIS Appendix G, Impact-Producing Factors Tables and Assessment of Resources with Minor (or Lower) Impacts. Although a quantitative emissions inventory

[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.

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 Final EIS is 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

The analysis using all available and complete information regarding proposed Project impacts on water quality is provided in Section G.2.2 in EIS Appendix G. No incomplete or unavailable information related to the impacts analysis on water quality was identified.

F.2.3 Bats

The analysis using all available and complete information regarding proposed Project impacts on bats is provided in Section G.2.3 in EIS Appendix G. 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, because U.S. offshore wind development is in its infancy, with only two offshore wind projects under construction at the time of this analysis, there is some level of uncertainty regarding the potential collision risk to individual bats that may be present within the offshore portions of the wind farm area. 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 Final 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

The analysis using all available and complete information regarding proposed Project impacts on benthic resources is provided in EIS Section 3.4. 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. Therefore, the analysis provided in the EIS, which is based on those results, is supported by the best available science, despite that additional studies would provide greater understanding to more fully 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

The analysis using all available and complete information regarding proposed Project impacts on birds is provided in Section G.2.4 in EIS Appendix G. 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 Final 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 Final 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 Final 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 Final 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, 2023). 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 Final 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 Final 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

The analysis using all available and complete information regarding proposed Project impacts on coastal habitats and fauna is provided in EIS Section 3.5. 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

The analysis using all available and complete information regarding proposed Project impacts on finfish, invertebrates, and essential fish habitat (EFH) is provided in EIS Section 3.6. There is uncertainty regarding the spatial and temporal occurrence of finfish, invertebrates, and 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 2023), and the EFH Assessment (BOEM 2022).

Uncertainty also exists regarding the impact of some IPFs on invertebrate resources, such as the effects of EMF and underwater noise (e.g., generated from pile driving). The available information on invertebrate sensitivity to EMF is equivocal (Hutchinson et al. 2020), and sensitivity to sound pressure and particle motion effects is not well understood for many species, nor are synergistic or antagonistic impacts from multiple IPFs. Similarly, specific secondary impacts such as changes in diets throughout the food chain resulting from habitat modification are not well known for finfish and invertebrates. Where applicable, the assessment drew upon information in the available literature and an increasing number of monitoring and research studies related to wind development, other undersea development, or artificial reefs in Europe and the United States, several of which were recently drafted or published. These monitoring studies help provide a broad understanding of the overall impacts of these IPFs combined, if not individually.

For these reasons, the analysis provided in the 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 finfish, invertebrate, and EFH resources that is essential to a reasoned choice among alternatives.

F.2.8 Marine Mammals

The analysis using all available and complete information regarding proposed Project impacts on marine mammals is provided in EIS Section 3.7. 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.

In recognition of the uncertainty regarding potential ecosystem-level impacts from the presence of structures, BOEM asked the National Academies of Sciences, Engineering, and Medicine (NASEM) to evaluate the potential for offshore wind farms in the Nantucket Shoals region to affect oceanic physical processes, and, in turn, how those hydrodynamic alterations might affect local to regional ecosystems (NASEM 2024). The Nantucket Shoals region was selected because it supports aggregations of zooplankton that provide prey for the endangered North Atlantic right whales that migrate to the region to forage. The resulting report included the following two conclusions:

> Conclusion: The paucity of observations and uncertainty of the modeled hydrodynamic effects of wind energy development at the turbine, wind farm, and regional scales make potential ecological impacts of turbines difficult to predict and/or detect.
>
> Conclusion: The hydrodynamic impacts from offshore wind development in the Nantucket Shoals region on zooplankton will be difficult to isolate from the much larger magnitude of variability introduced by natural and other anthropogenic sources (including climate change) in this dynamic and evolving oceanographic and ecological system.

The report also included the following recommendation:

> The Bureau of Ocean Energy Management, National Oceanic Atmospheric Administration, and others should support, and where possible require, the collection of oceanographic and ecological observations through robust integrated monitoring programs within the Nantucket Shoals region and in the region surrounding wind energy areas before and during all phases of wind energy development: surveying, construction, operation, and decommissioning.

BOEM is currently working with NASEM and other research bodies to conduct the studies recommended by the report. However, NEPA does not require agencies to undertake new and technical research to inform a specific EIS. Moreover, the conclusions reached by the report indicate the effects are likely to be difficult to detect, thus the information resulting from these studies is not essential to a reasoned choice among the alternatives in this EIS. Finally, the timeline to complete these studies is a multi-year process that would be incompatible with the timelines for completing an EIS laid out by the Fiscal Responsibility Act amendments to NEPA, which BOEM sees as an indicator of an unreasonable cost under NEPA.

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 2023). BOEM used the best available information to predict potential impacts on marine mammals, and the analysis provided in the Final 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 analysis using all available and complete information regarding proposed Project impacts on sea turtles is provided in EIS Section 3.8. 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 2023). 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 2023).

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 2023). As such, the analysis provided in the Final 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

The analysis using all available and complete information regarding proposed Project impacts on terrestrial habitats and fauna is provided in Section G.2.5 in EIS Appendix G. 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 Non-Tidal Waters and Wetlands

The analysis using all available and complete information regarding proposed Project impacts on non-tidal waters and wetlands is provided in Section G.2.6 in EIS Appendix G. No incomplete or unavailable information related to the impacts analysis on non-tidal waters and wetlands was identified.

F.2.12 Commercial Fisheries and For-Hire Recreational Fishing

The analysis using all available and complete information regarding proposed Project impacts on commercial fisheries and for-hire recreational fishing is provided in EIS Section 3.9. 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 Final 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 Final 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

The analysis using all available and complete information regarding proposed Project impacts on cultural resources is provided in EIS Section 3.10. 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 analysis using all available and complete information regarding proposed Project impacts on demographics, employment, and economics is provided in EIS Section 3.11. 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

The analysis using all available and complete information regarding proposed Project impacts on environmental justice is provided in EIS Section 3.12. 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

The analysis using all available and complete information regarding proposed Project impacts on land use and coastal infrastructure is provided in Section G.2.7 in EIS Appendix G. 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 analysis using all available and complete information regarding proposed Project impacts on navigation and vessel traffic is provided in EIS Section 3.13. The navigation and vessel traffic impact analysis in the Final 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 2023) 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 NASEM study found impacts on marine vessel radar (MVR) from offshore WTGs (NASEM 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 (NASEM 2022). The sizes of anticipated offshore WTGs and projects would exacerbate these impacts (NASEM 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 (NASEM 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 NASEM 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)

The analysis using all available and complete information regarding proposed Project impacts on other uses is provided in EIS Section 3.14. 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 Final 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

The analysis using all available and complete information regarding proposed Project impacts on recreation and tourism is provided in EIS Section 3.15. No incomplete or unavailable information related to the impacts analysis on recreation and tourism was identified.

F.2.20 Scenic and Visual Resources

The analysis using all available and complete information regarding proposed Project impacts on scenic and visual resources is provided in EIS Section 3.16. 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 Final EIS. While the actual WTGs may differ from the assumed WTG characteristics, those differences are unlikely to change the impact determinations in the Final 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 (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 Final 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 • Increase in individual mortality due to collisions with operating WTGs
Benthic Resources	• Increase in suspended sediments and resulting impacts due to seafloor disturbance • Reduction in habitat as a result of seafloor surface alternations • Disturbance, displacement, and avoidance behavior due to habitat loss/alteration, equipment noise, and vessel traffic • Increase in individual mortality due to construction • 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 • 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 • Habitat quality alterations or loss of habitat • Displacement, disturbance, and avoidance behavior due to habitat loss/alteration, equipment noise, vessel traffic, increased turbidity, sediment deposition, and EMF • Increase in individual mortality due to construction activities

Resource Area	Potential Unavoidable Adverse Impacts of the Proposed Action
Marine Mammals	• Displacement, disturbance, and avoidance behavior due to habitat loss/alteration, equipment and vessel noise, and vessel traffic during construction and operations • Temporary loss of acoustic habitat and increased potential for vessel strikes • Increased risk for injury or mortality associated with fisheries gear
Sea Turtles	• Disturbance, displacement, and avoidance behavior due to habitat loss/alteration, equipment noise • Increased potential for vessel strikes • 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
Non-Tidal Waters and Wetlands	• Increase in low-level sedimentation of non-tidal waters and wetlands 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 • Disruption to harvesting activities during operations of offshore wind facility • Changes in vessel transit and fishing operation patterns
Cultural Resources	• Impacts on viewsheds of and to historic properties • 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 • 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 • Hindrance to subsistence fishing due to offshore construction and operation of the offshore wind facility
Land Use and Coastal Infrastructure	• Land use disturbance due to construction, as well as noise, vibration, and travel delays • Increase in potential for accidental releases during construction
Navigation and Vessel Traffic	• Change in vessel transit patterns • Congestion in port channels • Increased navigational complexity, vessel congestion, and allision risk within the offshore SWDA • 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 • Increased navigational complexity for military or national security vessels operating within the offshore SWDA • Need for changes in vessel transit patterns for military or national security vessels • Changes to aviation and air traffic navigation patterns • 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 • Alteration of marine and coastal recreation enjoyment and tourism activities due to WTGs • Disruption to access or temporary restriction of in-water recreational activities due to construction of offshore proposed Project elements • Temporary disruption to the marine environment and marine species important to fishing and sightseeing due to turbidity and noise • 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
Non-Tidal Waters and Wetlands	No	No	Although localized and temporary impacts on non-tidal waters and wetlands 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 Final 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.4 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.

F.6 References

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

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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
IWG	Interagency Working Group on Social Cost of Greenhouse Gases
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
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
SC-GHG	social cost of greenhouse gas
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. 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. 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 33 years would increase the risk of accidental releases. EIS Section G.2.2 discusses water quality. 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. 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. 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. 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. 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 33 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 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. 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. 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. 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. No future pile driving activities were identified within the geographic analysis area other than ongoing activities. New or expanded submarine cables and pipelines are likely to occur in the geographic analysis area. These disturbances would be infrequent over the next 33 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 33 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. 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. 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. The presence of transmission cable infrastructure, especially hard protection atop cables, causes impacts through entanglement/gear loss/damage, fish aggregation, and habitat conversion. 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). New cables installed in the geographic analysis area over the next 33 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. 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). 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. 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. 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. 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. 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. 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 33 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 33 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 and scientific surveys are anticipated to occur infrequently over the next 33 years. 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.

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	difficult to generalize, but impacts are local and temporary. 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. 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. 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.	New or expanded submarine cables and pipelines may occur in the geographic analysis area infrequently over the next 33 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. 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 33 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. 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 33 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 33 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. 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. 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 33 years. Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters over the next 33 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. 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. 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. 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. 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. Site characterization surveys and scientific surveys are anticipated to occur infrequently over

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. 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. 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. 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. 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.	the next 33 years. 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. New or expanded marine minerals extraction and commercial fisheries may intermittently increase noise during their operations and maintenance over the next 33 years. Impacts would likely be minimal and local. 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 33 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 33 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. 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. 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. 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. New cables, installed incrementally in the geographic analysis area for finfish, invertebrates, and EFH over the next 20 to 33 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. The infrequent installation of future new structures in the marine environment over the next 33 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). 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. 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. 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 33 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).	
Anchoring and gear utilization	Vessel anchoring related to ongoing military use and survey, commercial, and recreational activities continue to cause temporary to permanent impacts in the immediate area where anchors and chains meet the seafloor. Impacts on marine mammals could include entanglement and/or entrapment.	Impacts from anchoring may occur on a semi-regular basis over the next 33 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. These impacts would include entanglement and/or entrapment. All impacts on marine mammals are expected to be negligible based on the limited number of associated buoy lines, the short duration of sampling events, and low probability for gear entanglement given the short-term, low-intensity, and localized nature of the impacts.
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. 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. 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	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
	breeding, and/or foraging habitat availability, and disruptions in migration. 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.) 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 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). 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	Future low altitude aircraft activities such as survey activities and U.S. Navy training

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	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. 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). 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. 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,	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. Site characterization surveys and scientific surveys are anticipated to occur infrequently over the next 33 years. 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. Cable-laying impacts resulting from future non-offshore wind activities would be identical to those described for future offshore wind projects. 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
	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. There is a moderate risk of UXOs being present within the SWDA and OECC. Although the preferred approach for dealing with UXOs is to avoid altogether, they may require physical removal (low-order disposal) or in-situ detonations (high-order disposal). Due to the proposed mitigation and monitoring measures (EIS Appendix H, Mitigation and Monitoring) and the relatively small size of the peak pressure and acoustic impulse threshold ranges compared to PTS and TTS ranges for potential UXO detonations, no non-auditory injury or mortality is expected for any species (JASCO 2022). There is, however, potential for PTS and TTS during this activity particularly for high frequency cetaceans. 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 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

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
		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 fishing and increase the likelihood that marine mammals would encounter lost fishing gear. 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. 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.	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 (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	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

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	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).	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; OECC = offshore export cable corridor; PTS = permanent threshold shift; SPL = sound pressure level; SWDA = Southern Wind Development Area; TTS = temporary threshold shift; WTG = wind turbine generator; UXO = unexploded ordnance

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. 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	Gradually increasing vessel traffic over the next 33 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.

Associated IPF	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	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).	
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 2023). 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 2023). Turbidity associated with increased sedimentation may result in short-term and temporary impacts on sea turtle prey species.	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.
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*). 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. 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. 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-	No future activities were identified within the geographic analysis area other than ongoing activities.

Associated IPF	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	consequence impacts on sea turtle habitat use and migratory patterns. 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. 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.	
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 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).	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 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. 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 2023).	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. Non-offshore wind activities would not be expected to appreciably contribute to structure lighting. As such, no impact on sea turtles would be expected.

Associated IPF	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
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. 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. 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. 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. 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: • Potential mortal injury: 210 dB cumulative SPL or greater than 207 dB peak SPL (Popper et al. 2014)	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. Site characterization surveys and scientific surveys are anticipated to occur infrequently over the next 33 years. Impacts of these activities would be similar to those described for ongoing activities. 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). 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
	• Behavioral disturbance: 166 dB referenced to 1 µPa RMS 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 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	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.

Associated IPF	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	analysis area for sea turtles that would serve to concentrate recreational fishing and increase the likelihood that sea turtles would encounter lost fishing gear. 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. 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. 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.	
Traffic	Current activities contributing to vessel collisions include port traffic levels, fairways, traffic separation schemes, commercial vessel traffic, recreational and fishing activity, and scientific and academic vessel traffic. Propeller and collision injuries from boats and ships are common in sea turtles. Vessel strike is an increasing concern for sea turtles, especially in the southeastern United States, where development along the 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.	Vessel traffic associated with non-offshore wind development has the potential to result in an increased collision risk. 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.

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 33 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 acidification may contribute to reduced growth, or the decline of, invertebrates that have calcareous shells over the course of the next 33 years. Over time, this could potentially directly affect species that are important for commercial and for-hire recreational fisheries or their prey species.	No future activities were identified within the geographic analysis area other than ongoing activities.
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. 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. Ongoing site characterization surveys and scientific surveys produce noise around investigation sites. These activities can disturb fish and invertebrates in the	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 33 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

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	immediate vicinity of the investigation and cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions. 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. 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).	physical disturbance and sediment suspension. Therefore, fishery-level impacts are unlikely. Site characterization surveys and scientific surveys are anticipated to occur infrequently over the next 33 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. 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 33 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 33 years, with increased activity during construction. The ability of ports to receive the increase in vessel traffic may require port modifications, such as channel deepening, leading to local impacts on fish populations. Port expansions could also increase vessel traffic and competition for dockside services, which could affect fishing vessels.
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. 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-	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. New cables, installed incrementally in the geographic analysis area over the next 20 to 33 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

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	term impacts on fish but likely no impacts at a fishery level. 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. 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. 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 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. 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.	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. The infrequent installation of future new structures in the marine environment over the next 33 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. 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.
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	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.

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	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.	

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. 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 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.	Gradually increasing vessel traffic over the next 33 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 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. 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; and fisheries use and management. These activities are likely to continue to occur at current rates along the entire coast of the eastern United States.

Associated IPF	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
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. 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; and fisheries use and management.	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; and military use. Such activities could cause impacts on submerged archaeological resources including shipwrecks and formerly subaerially exposed pre-contact Native American archaeological sites. 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. 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 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. 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. 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.	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
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. 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 hazard lighting to prevent aircraft collision can cause these types of impacts.	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; and fisheries use and management. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time. Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore.
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; and fisheries use and management. 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 33 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. 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. 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 rate of onshore land disturbance is expected to continue at or near current rates.	Onshore development projects would be ongoing in accordance with local government land use plans and regulations.
Lighting	Offshore buoys and towers emit low-intensity light, while onshore structures, including houses and ports, emit substantially more light on an ongoing basis. 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. 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. 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. 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	Periodic trenching would be needed over the next 33 years for repair or installation of underground infrastructure. Planned new barge route and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain.

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	research vessels. Vessel noise is anticipated to continue at or near current levels.	
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 33 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. 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. 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 near the FADs, although recreational fishing is more popular because commercial mobile fishing gear is more likely to snag on FADs. 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. No existing offshore structures are within the viewshed of the SWDA except buoys. 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.	Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.
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. The region's substantial marine traffic may result in occasional vessel collisions, which would result in costs to the vessels involved. The likelihood of	New vessel traffic near the geographic analysis area would be generated by proposed barge routes and dredging demolition sites over the next 33 years. Marine commerce and related industries would continue to be important to the geographic analysis area economy. No substantial changes anticipated.

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	collisions is expected to continue at or near current rates.	

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 33 years.
Land disturbance	Potential erosion and sedimentation from development and construction is controlled by local and state development regulations. Onshore development supports local population growth, employment, and economics. 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. Onshore development would continue in accordance with local government land use plans and regulations. 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. 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. 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	Periodic trenching would be needed over the next 33 years for repair or installation of underground infrastructure. Planned new barge route and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain.

Associated IPFs	**Ongoing Activities**	**Future Non-Offshore Wind Activities Intensity/Extent**
	typically less prominent than the impacts of the physical disturbance and sediment suspension. 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.	
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. 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. Current structures do not result in space use conflicts. There are no existing offshore structures within the viewshed of the SWDA except buoys. 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.	Vessel traffic is generally not expected to meaningfully increase over the next 33 years. The presence of navigation hazards is expected to continue at or near current levels. Existing cable operations and maintenance activities would continue within and offshore from the geographic analysis area.
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 33 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.	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

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	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.	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 33 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.
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. 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. 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. 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	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 33 years. Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion. Fishing near artificial reefs is not expected to change meaningfully over the next 33 years. 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 33 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.

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	field levels. The presence of structures and operation noise could cause mammals to avoid areas. 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. 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.	
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. 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 33 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. 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. 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. 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.	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 33 years. Marine commerce and related industries would continue to be important to the geographic analysis area economy. No substantial changes anticipated.

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	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.	

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. Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Anticipated modest growth in vessel traffic would result in some growth in the nighttime traffic of vessels with lighting. 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. 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. Offshore trenching occurs periodically in connection with cable installation or sand and gravel mining. 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	Ports would need to perform maintenance and upgrade facilities over the next 33 years to ensure that they can still receive the projected

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	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. Nearly all ports and harbors in the geographic analysis area for recreation and tourism require periodic maintenance dredging.	future volume of vessels visiting their ports and are able to host larger deep draft vessels as they continue to increase in size. 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. 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. 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. The only existing offshore structures within the viewshed of the proposed Project are minor features such as buoys.	Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion. Vessel traffic, overall, is not expected to meaningfully increase over the next 33 years. The presence of navigation hazards is expected to continue at or near current levels. 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.
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. 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 33 years. Marine commerce and related industries would continue to be important to the geographic analysis area economy. 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	The anticipated modest growth in regional vessel traffic would marginally increase the number of vessels operating at night with lighting.

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	be visible is approximately 48 miles, reflecting curvature of the earth and the coefficient of refraction (COP Appendix III-H.a; Epsilon 2023). 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). 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.	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 33 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	The largest air quality impacts over the next 33 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

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	modifications to existing fossil fuel power plants, onshore and offshore activities involving renewable energy facilities, and various construction activities.	emissions overall would decline and the industry as a whole would have a net benefit on air quality. 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 33 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. 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. 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.
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 33 years. However, these contributions would be minimal compared to aggregate global emissions. The impact on climate change from these activities would be negligible. 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	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.

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	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). 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.	As population and vessel traffic increase gradually over the next 33 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 33 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 disturbances would be short term, and either be limited to the emplacement corridor or localized.	Suspension of sediments may continue to occur infrequently over the next 33 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 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 USACE. 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,	Ground disturbance associated with construction of onshore components could lead to unvegetated or unstable soils. Precipitation events could

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	leading to potential erosion and sedimentation impacts and subsequent increased turbidity. 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.	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. 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 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.	The general trend along the coastal region from Virginia to Maine is that port activity will increase modestly over the next 33 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 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. 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.

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
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. 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 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).	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. 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.
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 2022a). 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. 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 33 years is expected to continue. These structures would not be expected to cause disturbance to migrating tree bats. The infrequent installation of future new structures in the marine environment of the next 33 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. 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 blockages caused by both hard and soft plastic debris (Roman et al. 2019).	Gradually increasing vessel traffic over the next 33 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. As population and vessel traffic increase gradually over the next 33 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.
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. 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. Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters over the next 33 years, influencing the frequencies and distributions of various	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
	diseases of birds, as well as the distribution of bird prey resources. 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). The proliferation of coastline protections has the potential to result in long-term and high-consequence, impacts on bird nesting habitat.	
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 may lead to accidental trash ingestion (see accidental releases). Population-level impacts would not be expected. 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.	Gradually increasing vessel traffic over the next 33 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 collision with vessels but may lead to accidental trash ingestion (see accidental releases). No population-level impacts would be expected. 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. 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	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. The impact of future site characterization surveys and pile driving would be the same as ongoing activities. 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
	displacement were to occur in preferred feeding areas during seasonal migration periods. 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. 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. 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.	
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. 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. The area includes an assortment of navigation and weather buoys plus a handful of light towers (BOEM 2022a). 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	New cables installed incrementally in the geographic analysis area for birds over the next 20 to 33 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. The infrequent installation of future new structures in the marine environment over the next 33 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.

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	be attracted to these structures and opportunistically roost on these 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 33 years.	No future activities were identified within the geographic analysis area other than ongoing activities.
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. 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. 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	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
	vehicle, commercial, and industrial noises in the geographic analysis area.	

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 Non-Tidal Waters and Wetlands

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.
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 non-tidal waters and 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.

Associated IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
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. 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 2023). 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 1,117 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 (13.5 nautical miles) of each area potentially affected by the proposed Project, including the Rhode Island and Massachusetts Lease Areas (RI/MA Lease Areas), onshore construction areas, and construction ports. Table G.1-14 describes existing conditions and the impacts, based on the IPFs 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, Part 81 (40 CFR Part 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.

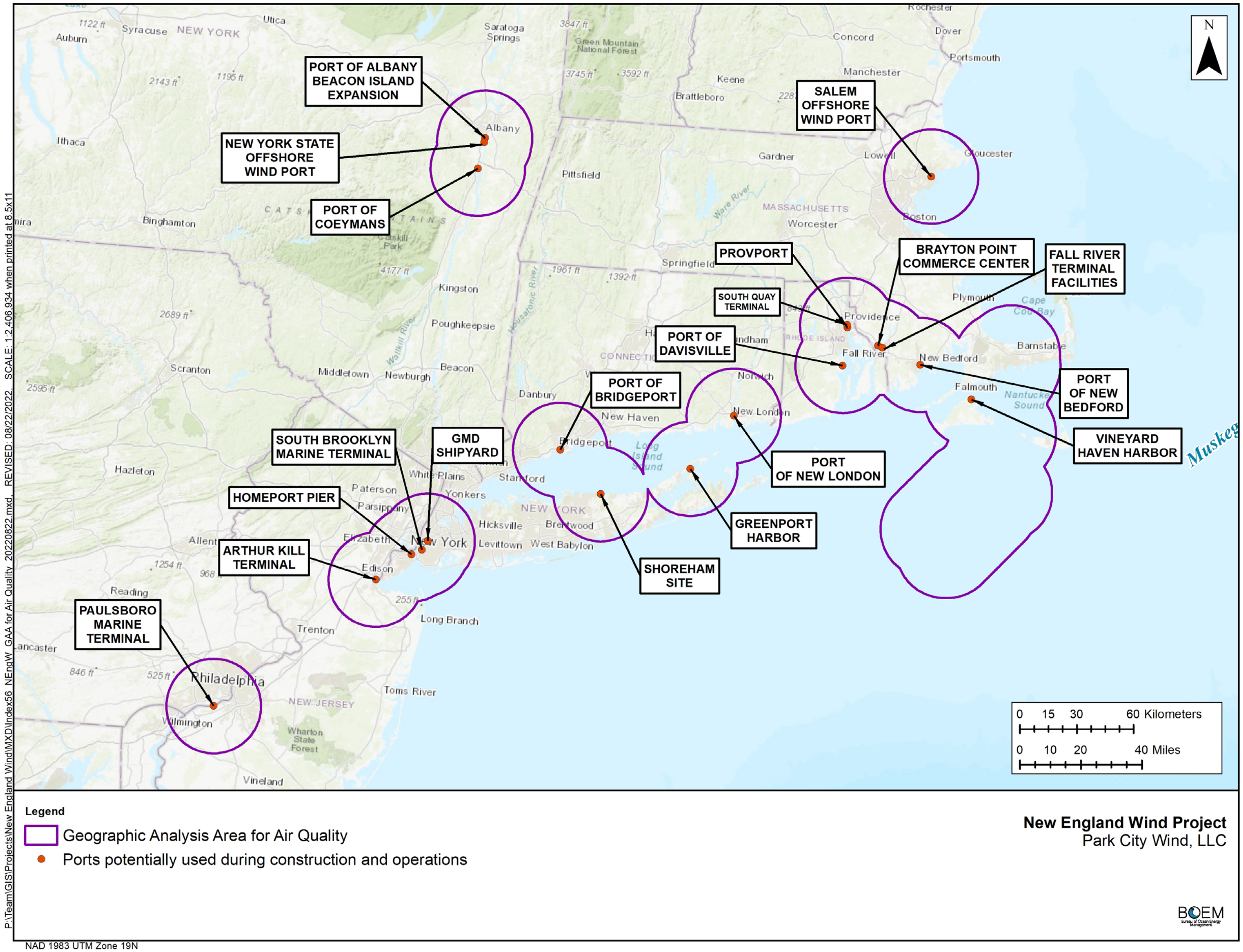

Figure G.2.1-1: Geographic Analysis Area for Air Quality

The CAA defines Class I areas as certain national parks and wilderness areas where very little degradation of air quality is allowed. Class I areas consist of national parks larger than 6,000 acres and wilderness areas larger than 5,000 acres that were in existence before August 1977. Projects subject to federal permits are required to notify the federal land manager responsible for designated Class I areas within 62 miles of the proposed Project. The federal land manager identifies appropriate air quality-related values for the Class I area and evaluates the impact of the proposed Project on air quality-related values. The Class I areas closest to the proposed Project are the Brigantine Wilderness Area in New Jersey, the Lye Brook Wilderness Area in Vermont, the Presidential Range-Dry River Wilderness Area in New Hampshire, and the Great Gulf Wilderness Area in New Hampshire. The proposed Project identifies several port facilities that could be used for Phase 1 construction staging activities shown on Figure G.2.1-1. The Paulsboro Marine Terminal falls within 62 miles of the Brigantine Wilderness Area, and the Port of Coeymans, New York State Offshore Wind Port, and the Port of Albany Beacon Island Expansion all fall within 62 miles of the Lye Brook Wilderness Area.

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 Part 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 2023), 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 the 1971 CO standard since 2002 and the 2006 $PM_{2.5}$ standard since 2014.

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 maintenance for the 2006 $PM_{2.5}$ standard since 2014 (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.

Table G.2.1-1 presents the total emission inventory in tons per year for select regulated pollutants (i.e., CO, NO_X, PM_{10}, $PM_{2.5}$, SO_2, and volatile organic compounds [VOC]) in nonattainment counties in 2017.

Table G.2.1-1: Nonattainment Counties, 2017 Emission Inventory for Regulated Pollutant (Tons Per Year)

County, State	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
Fairfield County, Connecticut	87,100	12,159	4,872	2,383	797	22,810
Middlesex County, Connecticut	18,099	2,978	1,340	665	192	9,886
New Haven County, Connecticut	67,173	9,866	3,867	1,976	499	20,705
New Castle County, Delaware	58,568	12,164	8,134	2,412	722	11,600
Sussex County, Delaware	40,026	7,614	5,134	1,483	638	13,993
Dukes County, Massachusetts	6,396	989	388	135	12	2,739
Bergen County, New Jersey	87,009	13,033	2,949	1,887	171	15,095
Cape May County, New Jersey	18,832	2,883	959	477	61	9,014
Cumberland County, New Jersey	17,272	2,947	1,996	973	257	11,652
Gloucester County, New Jersey	30,398	6,262	2,064	1,310	599	10,502

County, State	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
Hudson County, New Jersey	27,067	9,948	1,493	844	141	8,265
Middlesex County, New Jersey	67,745	12,498	3,413	1,894	231	15,476
Monmouth County, New Jersey	59,952	8,988	2,967	1,637	154	14,384
Salem County, New Jersey	8,511	2,385	1,910	562	695	4,346
Bronx County, New York	29,896	6,003	2,442	1,118	181	9,920
Kings County, New York	59,475	13,572	4,707	2,559	478	17,661
Nassau County, New York	94,282	15,044	5,960	2,478	498	19,677
New York County, New York	82,796	18,826	11,984	3,903	883	16,026
Queens County, New York	77,405	19,235	6,264	2,978	1,178	20,593
Richmond County, New York	20,515	5,579	1,424	658	120	5,226
Rockland County, New York	24,592	4,552	1,946	851	180	7,251
Suffolk County, New York	146,719	20,338	9,309	3,888	1,200	32,677
Westchester County, New York	81,598	11,710	5,402	2,349	505	18,651
Delaware County, Pennsylvania	42,091	9,852	3,718	1,852	1,435	10,278

CO = carbon monoxide; 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

G.2.1.2 Environmental Consequences

Definitions of impact levels for air quality are described in Table G.2.1-2. 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.2.1-2: 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 existing conditions for air quality (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 (Vineyard Wind 1) 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 air quality 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 567 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 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 major source 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 0486 (Revolution Wind), OCS-A 0500 (Bay State Wind), OCS-A 0501 (Vineyard Wind 1), OCS-A 0520 (Beacon Wind), and OCS-A 0521 (SouthCoast Wind Energy Project [SouthCoast Wind]), and a portion of OCS-A 0487 (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 567 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 2023 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.2.1-3.

Table G.2.1-3: 2023–2030 Construction Emissions, Future Offshore Wind Projects, Geographic Analysis Area

	Total Emissions (tons)[a]						
Project	NO_x	VOCs	CO	PM_{10}	$PM_{2.5}$	SO_2	CO_2e
Sunrise Wind (OCS-A 0487)	2,093	49	869	39	39	2	230,504
Revolution Wind (OCS-A 0486)	22,395	81	5,468	758	732	69	1,702,429
Vineyard Wind 1 (OCS-A 0501)	4,961	122	1,116	172	125	38	250,920
Bay State Wind (OCS-A 0500)[b]	9,167	149	2,397	452	75	61	304,762
Beacon Wind (OCS-A 0520)[b]	17,677	730	1,758	290	270	508	1,012,652
SouthCoast Wind (OCS-A 0521)[b]	39,965	1590	8,284	2,897	1,566	1,556	2,633,405
Total	**99,396**	**2,720**	**20,432**	**4,607**	**2,806**	**2,234**	**6,134,672**

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 SouthCoast 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 8.5 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 (99,396 tons) and CO (20,432 tons), mostly 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 (1,680 tons per year) and CO (456 tons per year). The other criteria pollutants would each account for approximately 35 to 70 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 537,931 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 CO_2e 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 30 gigawatts of future offshore wind development is presented in Table G.2.1-4. These ranges were created by converting the scenarios analyzed in Buonocore et al. (2016) to dollars and annual premature deaths avoided per megawatt hour, 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.2.1-4: Representative Range of Annual Health and Climate Benefits and Annual Premature Deaths Avoided from 30 Gigawatts of Offshore Wind Development

Planned Action Estimate Range Level	Annual Air Quality Health Benefit	Annual Premature Deaths Avoided	Notes
Low	$6.33 billion	631	This range includes the smallest financial impacts per megawatt hour and number of deaths avoided.
Medium	$10.12 billion	778	This range includes the mean financial impact per megawatt hour and number of deaths avoided.
High	$14.07 billion	1,324	This range includes the largest financial impact per megawatt hour and number of deaths avoided.

Source: Buonocore et al. 2016

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 **minor** and **moderate** beneficial.

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.

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 **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. When analyzing the impacts of Alternative B on air quality, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for 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 2023).

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

2023). 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 2023). 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 4,226 gallons of coolants, 237,232 gallons of oils and lubricants, and 10,936 gallons of diesel fuel in its two ESP foundations within the air quality geographic analysis area (COP Volume I, Table 3.3-6; Epsilon 2023). 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 33-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 18 months with only an approximate 3-month pause (COP Volume I, Figure 3.1-3; Epsilon 2023). The applicant's voluntarily committed emission-reduction measures include fuel-efficient engines; marine diesel engines that meet or emit less than applicable emission standards set by Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) treaty and the Code of Federal Regulations, Title 40, Sections 89, 94, and 1042 (40 CFR Parts 89, 94, 1042); 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 2023). The OCS air permit may contain additional requirements pertaining to the emission standards of engines or the use of other control technology on appliable air pollutant sources. The applicant will adhere to all additional requirements outlined in the final OCS air permit. 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 2023). 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 2023). 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.2.1-5 (COP Volume III, Appendix B; Epsilon 2023).

Table G.2.1-5: Estimated Construction Emissions, Phase 1

Activity	Total Emissions (tons)							
	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. There may also be emissions from other construction equipment used aboard vessels such as pile-driving hammer engines and noise mitigation devices (e.g., air compressors used to supply air to bubble curtains) should they be required during pile driving. 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. 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.2.1-6 shows the estimated operations emissions for Phase 1 (COP Volume III, Appendix B; Epsilon 2023).

Table G.2.1-6: 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 2023). 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 33-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.2.1-6, 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 on air quality in a supplemental NEPA analysis, if the SCV is selected. The volumes and impacts of Phase 2 emissions are discussed below.

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 2023). The total construction emissions of each pollutant for Phase 2 are summarized Table G.2.1-7, as well as in the COP (Volume III, Table 5.1-7 and Volume III, Appendix B, Table 3.3-1; Epsilon 2023).

Accidental releases: Phase 2 could release HAPs because of accidental chemical spills. Phase 2 would have up to about 517,978 gallons of coolants, 820,526 gallons of oils and lubricants, and 159,100 gallons of diesel fuel in its 86 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 2023). 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.

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

[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.

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.2.1-7 shows the estimated construction emissions for Phase 2 (COP Volume III, Appendix B; Epsilon 2023).

Table G.2.1-7: 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 2023) and summarizes emissions during operations (COP Volume III, Appendix B, Table 3.3-2; Epsilon 2023). Operations activities would be similar to those in Phase 1 and include WTG operations, planned maintenance, and unplanned emergency maintenance.
Table G.2.1-8 shows the estimated operations emissions for Phase 2 (COP Volume III, Appendix B; Epsilon 2023).

Table G.2.1-8: 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 2023). 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.

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.

Social Cost of Carbon

The overall impacts of GHG emissions can be assessed using “social costs.” The social cost of carbon, social cost of nitrous oxide, and social cost of methane—together, the social cost of GHGs (SC-GHG)—are estimates of the monetized damages associated with incremental increases in GHG emissions in a given year. CEQ is currently updating its 2016 guidance document (81 Fed. Reg. pp. 51866–51867 [August 5, 2016]) on consideration of GHGs and climate change under NEPA. While CEQ works on updated guidance, it has instructed agencies to consider and use all tools and resources available to them in assessing GHG emissions and climate change impacts, including its 2016 GHG guidance document. The 2016 CEQ guidance noted that NEPA does not require monetizing costs and benefits but allows the use of the social cost of carbon, SC-GHG, or other monetized costs and benefits of GHGs in weighing the merits and drawbacks of alternative actions. SC-GHG estimates are presented below for purposes of information and disclosure.

For federal agencies, the best currently available estimates of SC-GHG are the interim estimates of the social costs of CO_2, methane, and nitrous oxide developed by the Interagency Working Group on SC-GHG (IWG) and published in its Technical Support Document (IWG 2021). IWG’s SC-GHG estimates are based on complex models describing how GHG emissions affect global temperatures, sea level rise, and other biophysical processes; how these changes affect society through, for example, agricultural, health, or other impacts; and monetary estimates of the market and nonmarket values of these impacts. One key parameter in the models is the discount rate, which is used to estimate the present value of the stream of future damages associated with emissions in a particular year. The discount rate accounts for the time value of money (i.e., a general preference for receiving economic benefits now rather than later, by discounting benefits received later). A higher discount rate assumes that future benefits or costs are more heavily discounted than benefits or costs occurring in the present (i.e., future benefits or costs are less valuable or are a less significant factor in present-day decisions). IWG developed the current set of interim estimates of SC-GHG using three different annual discount rates: 2.5 percent, 3 percent, and 5 percent (IWG 2021).

There are multiple sources of uncertainty inherent in the SC-GHG estimates. Some sources of uncertainty relate to physical impacts of GHG emissions, human behavior, future population growth and economic changes, and potential adaptation (IWG 2021). To better understand and communicate the quantifiable uncertainty, the IWG method generates several thousand estimates of the social cost for a specific gas, emitted in a specific year, with a specific discount rate. These estimates create a frequency distribution based on different values for key uncertain climate model parameters. The shape and characteristics of that frequency distribution demonstrate the magnitude of uncertainty relative to the average or expected outcome.

To further address uncertainty, IWG recommends reporting four SC-GHG estimates in any analysis. Three of the SC-GHG estimates reflect the average damages from the multiple simulations at each of the three discount rates. The fourth value represents higher-than-expected economic impacts from climate change. Specifically, it represents the 95th percentile of damages estimated, applying a 3 percent annual discount rate for future economic impacts. This is a low-probability but high-damage scenario and represents an upper bound of damages within the 3 percent discount rate model. The following estimates follow the IWG recommendations.

Table G.2.1-9 presents the SC-GHG associated with estimated emissions from Alternative B. These estimates represent the present value of future market and nonmarket costs associated with CO_2, methane, and nitrous oxide emissions and are the sum of the social costs for CO_2, methane, and nitrous oxide over the proposed Project lifetime. In accordance with IWG's recommendation, four estimates were calculated based on IWG estimates of social cost per metric ton of emissions for a given emissions year and the applicant's estimates of emissions in each year. In Table G.2.1-9, negative values represent social benefits of avoided GHG emissions. The negative values for net SC-GHG indicate that the impact of Alternative B on GHG emissions and climate would be a net benefit in terms of SC-GHG.

Table G.2.1-9: Estimated Social Cost of Greenhouse Gases Associated with Alternative B

	Social Cost of GHGs (2023$)[a]			
Description	**Average Value, 5% Discount Rate**	**Average Value, 3% Discount Rate**	**Average Value, 2.5% Discount Rate**	**95th Percentile Value, 3% Discount Rate**
Construction, operations, and decommissioning	$244,800,000	$932,321,000	$1,429,593,000	$2,536,578,000
Avoided emissions[b]	$3,076,820,000	$12,035,226,000	$18,451,380,000	$34,108,185,000
Net SC-GHG[2]	- $2,832,020,000	- $11,102,905,000	- $17,021,787,000	- $31,571,607,000

CO_2 = carbon dioxide; GHG = greenhouse gas; SC-GHG = social cost of greenhouse gas
[a] The following calendar years were used in calculating SC-GHG: Phase 1 construction (2024 through 2027), Phase 1 operations and Phase 2 construction (2028 through 2031), Phase 1 and Phase 2 operations (2032 through 2057), Phase 1 decommissioning and Phase 2 operations (2058 through 2061), and Phase 2 decommissioning (2062 through 2065).
[b] Negative cost values indicate benefits.

Alternative B would produce GHG emissions that contribute to climate change; however, its contribution would be less than the emissions reductions from fossil-fueled sources during operations of the proposed Project. Because GHG emissions disperse and mix within the troposphere, the climatic impact of GHG emissions does not depend on the source location. Therefore, regional climate impacts are largely a function of global emissions. Nevertheless, Alternative B would have negligible impacts on climate change during these activities and an overall net beneficial impact on criteria pollutant and O_3 precursor emissions and GHGs, compared to a similarly sized fossil-fueled power plant or to the generation of the same amount of energy by the existing grid.

Climate change can make ecosystems, resources, and communities more susceptible to climate change, as well as lessen resilience to other environmental impacts apart from climate change. In some instances, this may exacerbate the environmental impacts of a project. Although the proposed Project would produce criteria pollutant emissions, the predicted impacts are anticipated to be within applicable standards, as required by the OCS permit, and would be unlikely to contribute substantially to increasing susceptibility or decreasing resilience of ecosystems. Similarly, foreseeable climate change would be unlikely to contribute substantially to the impacts of criteria pollutant emissions from the proposed Project.

Overall, it is anticipated that there would be a net reduction in GHG emissions, and no collective adverse impact on climate change would occur as a result of offshore wind projects. Additional offshore wind projects would likely contribute a relatively small emissions increase of CO_2. Development of offshore wind projects, including Alternative B, would cause some GHG emissions to increase, primarily through emissions of CO_2. The additional GHG emissions anticipated from the planned activities, including Alternative B, over the next 35-year period would have a negligible incremental contribution to existing GHG emissions.

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 be **minor**, as well as **moderate** 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 **moderate** 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. The applicant has proposed a mitigation measure to reduce potential impacts by developing and implementing dust control plans for onshore construction areas (EIS Table H-1; 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 **moderate** 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

When analyzing the impacts of Alternative C on air quality, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for 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 export cables through Muskeget Channel and could 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: **minor** and **moderate** beneficial. The cumulative impacts of Alternative C on air quality would also be **moderate** and **moderate** beneficial.

Impacts of the Preferred Alternative – Habitat Impact Minimization Alternative on Air Quality with the Western Muskeget Variant Contingency Option

Impacts on air quality from the Preferred Alternative would be as follows:

- The Preferred Alternative cable alignment would be identical to Alternative C-1 (Scenario 1 for Phase 2) if the Western Muskeget Variant Contingency Option were not exercised, resulting in impacts from cable placement that would align with those described for Alternative C-1.
- The Preferred Alternative cable alignment would be identical to Alternative B (Scenario 2 for Phase 2) if the Western Muskeget Variant Contingency Option were exercised, resulting in impacts from the cable placement that would align with those described for Alternative B.

- The Preferred Alternative would not allow for the co-location of ESPs at up to two locations, resulting in 130 WTG or ESP positions, as opposed to the potential of up to 132 WTG or ESP positions (Table H-2 in EIS Appendix H), as described under Alternative B. This would reduce the potential impacts on air quality by a negligible increment for both Phase 1 and Phase 2, as there could be two fewer structures (WTGs or ESPs) potentially installed in the SWDA.

While the Preferred Alternative would slightly reduce the extent of adverse impacts on air quality relative to Alternative B, the general scale, nature, and duration of impacts are comparable to those described for Alternative B. The Preferred Alternative would have **minor** impacts on air quality and **moderate** beneficial impacts within the geographic analysis area. The cumulative impacts of the Preferred Alternative would be similar to those of Alternative B: **moderate** and **moderate** beneficial.

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 2023), 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 2023).	10.2–12.7 µM 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

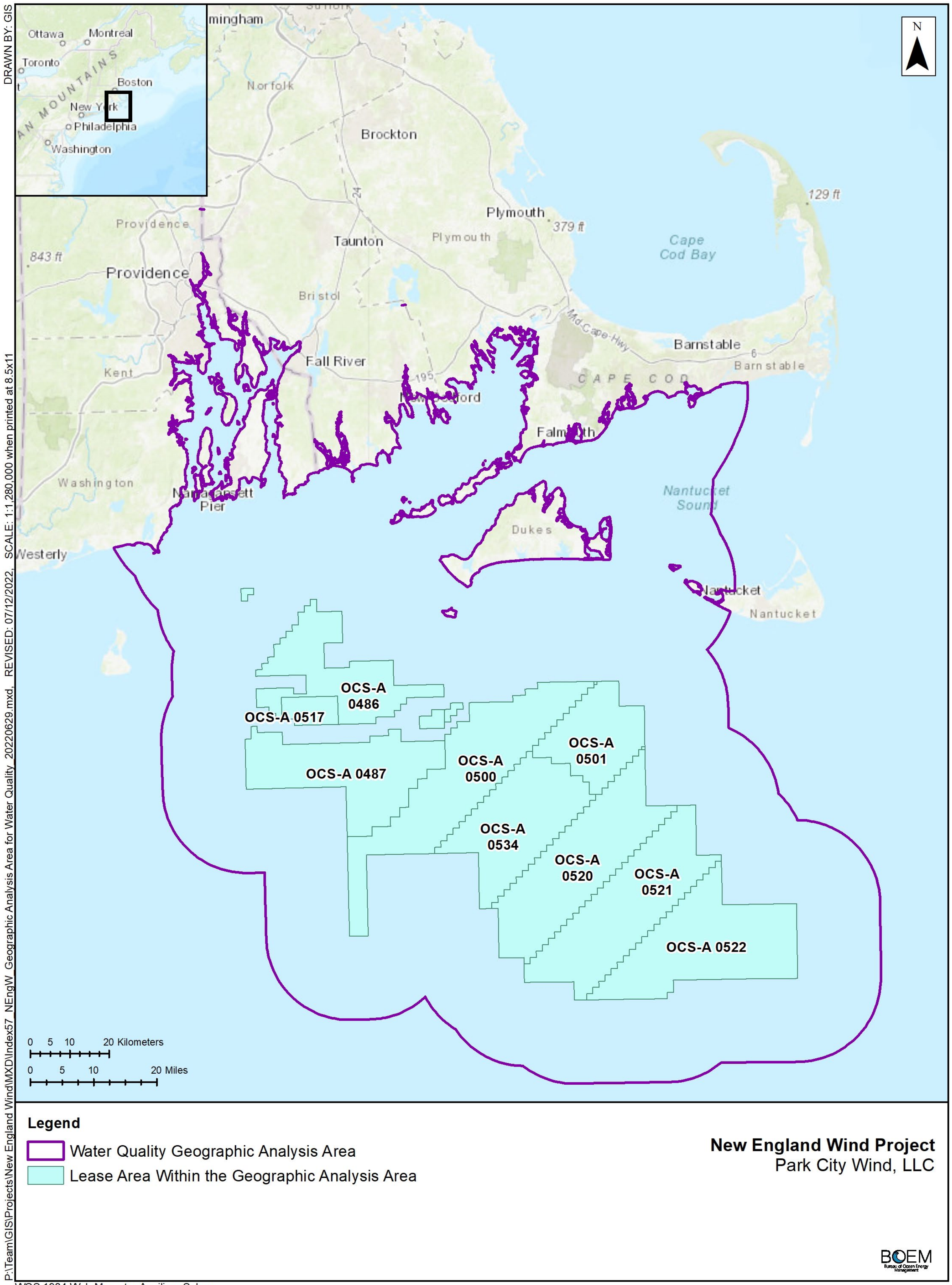

Figure G.2.2-1: Geographic Analysis Area for Water Quality

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 Type	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 existing conditions for water quality (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 33-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 water quality 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 (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 in Appendix E, 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 674 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 accidentally released into the marine environment can harm marine animals through entanglement and ingestion. Vessel operators will adhere to 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 6,041 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 RI/MA Lease Areas beginning in 2023 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 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, 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 2022b). 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. The warmer outflow from high-voltage DC is "generally accepted as a minimal effect," and any such discharges must be permitted through the USEPA's NPDES (BOEM 2022b). 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 684 structures in the water, 2,823 acres of impact from installation of foundations and scour protection, and 430 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. The 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. Future offshore wind activities in the geographic analysis area combined with ongoing activities would result in **minor** impacts on water quality. BOEM has considered the possibility of impacts resulting from accidental releases, and moderate impacts 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 impacts on water quality. Overall cumulative 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. When analyzing the impacts of Alternative B on water quality, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for 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 2023). 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 2023), 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, Non-Tidal Waters and Wetland), 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 2023). 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 2,468 acres between 2023 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 2023). 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 2023). 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 2023). 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 2023). 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 and are discussed below.

Phase 1 would add up to 64 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 2023). 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 2023). 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, if the SCV is selected. 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 2023) 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 2023). 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 2023). 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 be 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 **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 be **minor**. Overall impacts associated with Alternative B when combined with past, present, and future actions would be localized, minor, 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

When analyzing the impacts of Alternative C on water quality, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for 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 export cables through Muskeget Channel and could 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 those of Alternative B. Therefore, the impacts of Alternatives C-1 and C-2 on water quality would be the same as those for Alternative B: **minor**. Cumulative impacts of Alternative C on water quality would also be **minor**.

Impacts of the Preferred Alternative – Habitat Impact Minimization Alternative on Water Quality with the Western Muskeget Variant Contingency Option

Impacts on water quality from the Preferred Alternative would be as follows:

- The Preferred Alternative cable alignment would be identical to Alternative C-1 (Scenario 1 for Phase 2) if the Western Muskeget Variant Contingency Option were not exercised, resulting in impacts from cable placement that would align with those described for Alternative C-1.
- The Preferred Alternative cable alignment would be identical to Alternative B (Scenario 2 for Phase 2) if the Western Muskeget Variant Contingency Option were exercised, resulting in impacts from the cable placement that would align with those described for Alternative B.

- The Preferred Alternative would not allow for the co-location of ESPs at up to two locations, resulting in 130 WTG or ESP positions, as opposed to the potential of up to 132 WTG or ESP positions (Table H-2 in EIS Appendix H), as described under Alternative B. This would reduce the potential impacts on water quality by a negligible increment for both Phase 1 and Phase 2, as there could be two fewer structures (WTGs or ESPs) potentially installed in the SWDA.

While the Preferred Alternative would slightly reduce the extent of adverse impacts on water quality relative to Alternative B, the general scale, nature, and duration of impacts are comparable to those described for Alternative B. The Preferred Alternative would have **minor** impacts on water quality within the geographic analysis area. The cumulative impacts of the Preferred Alternative would be similar to those of Alternative B: **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.

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.1-16 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	Endangered
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 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).

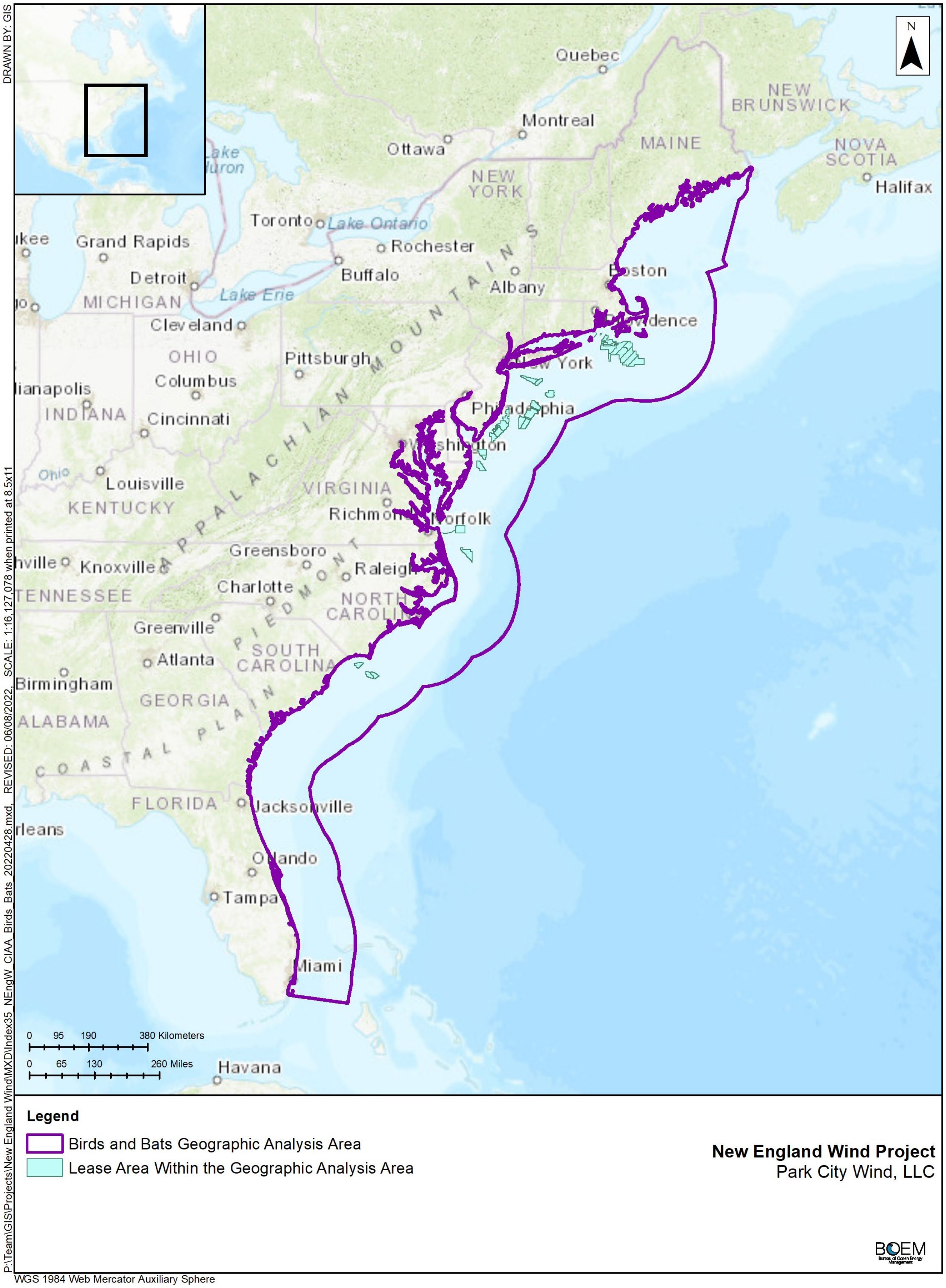

Figure G.2.3-1: Geographic Analysis Area for Bats

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 2023), 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 2022a). 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. On March 31, 2023, the Final Rule became effective, and the full suite of prohibitions and exceptions to take of endangered species is applied to the northern long-eared bat, and exemptions for incidental take of the species, as described under the current 4(d) Rule, no longer apply (87 Fed. Reg. 56 [March 23,2022]). On April 13, 2023, an official USFWS Information for Planning and Consultation review of the proposed Project was conducted. Based upon the review and a standing analysis, the proposed Project has reached a "no effect" determination, and no further actions relative to the Endangered Species Act (ESA) will be required for the species (USFWS 2023). Further details regarding potential impacts on northern long-eared bats are provided in the proposed Project-specific BA (BOEM 2022a). While the tri-colored bat has not been officially listed, BOEM has addressed the species in the Project-specific BA. A review of both the North American Bat Monitoring Program and the Massachusetts Rare Species database showed a lack of occurrence records for the species in the vicinity of proposed offshore and onshore Project elements. As such, BOEM expects that there will be "no effect" on tri-colored bats and that no further actions relative to the ESA will be required for the species if the proposed listing becomes effective. Further details regarding potential impacts on tri-colored bats are provided in the proposed Project-specific BA (BOEM 2022a).

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 northern long-eared and tri-colored bats, 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).. 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 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. 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 2023 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.

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 3,037 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 2023 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 likely 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 3,037 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, 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 3,037 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 2022a), 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 Alternative A 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.

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. BOEM anticipates that the cumulative impacts under Alternative A would likely be **negligible** because bat presence on the OCS is anticipated to be limited, and onshore bat habitat impacts are not expected to be measurable.

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. When analyzing the impacts of Alternative B on bats, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for bats. BOEM prepared a BA for the potential impacts on USFWS federally listed species, which found that Alternative B would have no impact on listed bat species and/or designated critical habitat (BOEM 2022a).

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.

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). Negligible 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 3,037 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-1 and H-2 of EIS Appendix H, Mitigation and Monitoring. The Final EIS lists 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.

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. Negligible 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 3,037 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 may include 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 lists 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** because impacts would be so small as to be unmeasurable.

Conclusions

Impacts of Alternative B. In summary, Alternative B would have **negligible** impacts on bats, especially if construction and decommissioning are conducted outside the active season. Operation of the offshore WTGs could lead to bat mortality, although this would be rare.

Cumulative Impacts of Alternative B. The cumulative impacts on bats within the geographic analysis area would be **negligible**. 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 cumulative impacts primarily through the permanent onshore habitat loss. The cumulative impacts of Alternative B 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 may include 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 lists 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 Alternative C – Habitat Impact Minimization Alternative on Bats

When analyzing the impacts of Alternative C on bats, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for 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. Alternatives C-1 and C-2 would alter the exact routes of export cables through Muskeget Channel and could 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 be the same as those for Alternative B: **negligible**. Cumulative impacts of Alternative C on bats would also be **negligible**.

Impacts of the Preferred Alternative – Habitat Impact Minimization Alternative on Bats with the Western Muskeget Variant Contingency Option

Impacts on bats from the Preferred Alternative would be as follows:

- The Preferred Alternative cable alignment would be identical to Alternative C-1 (Scenario 1 for Phase 2) if the Western Muskeget Variant Contingency Option were not exercised, resulting in impacts from cable placement that would align with those described for Alternative C-1.
- The Preferred Alternative cable alignment would be identical to Alternative B (Scenario 2 for Phase 2) if the Western Muskeget Variant Contingency Option were exercised, resulting in impacts from the cable placement that would align with those described for Alternative B.
- The Preferred Alternative would not allow for the co-location of ESPs at up to two locations, resulting in 130 WTG or ESP positions, as opposed to the potential of up to 132 WTG or ESP positions (Table H-2 in EIS Appendix H), as described under Alternative B. This would reduce the potential impacts on bats by a negligible increment for both Phase 1 and Phase 2, as there could be two fewer structures (WTGs or ESPs) potentially installed in the SWDA.

While the Preferred Alternative would slightly reduce the extent of adverse impacts on bats relative to Alternative B, the general scale, nature, and duration of impacts are comparable to those described for Alternative B. The Preferred Alternative would have **negligible** impacts on bats within the geographic analysis area. The cumulative impacts of the Preferred Alternative would be similar to those of Alternative B: **negligible** because no measurable impacts would be expected due to the expected absence of bats within the SWDA.

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 2023). 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 2022a).

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 2023).

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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 2022a).

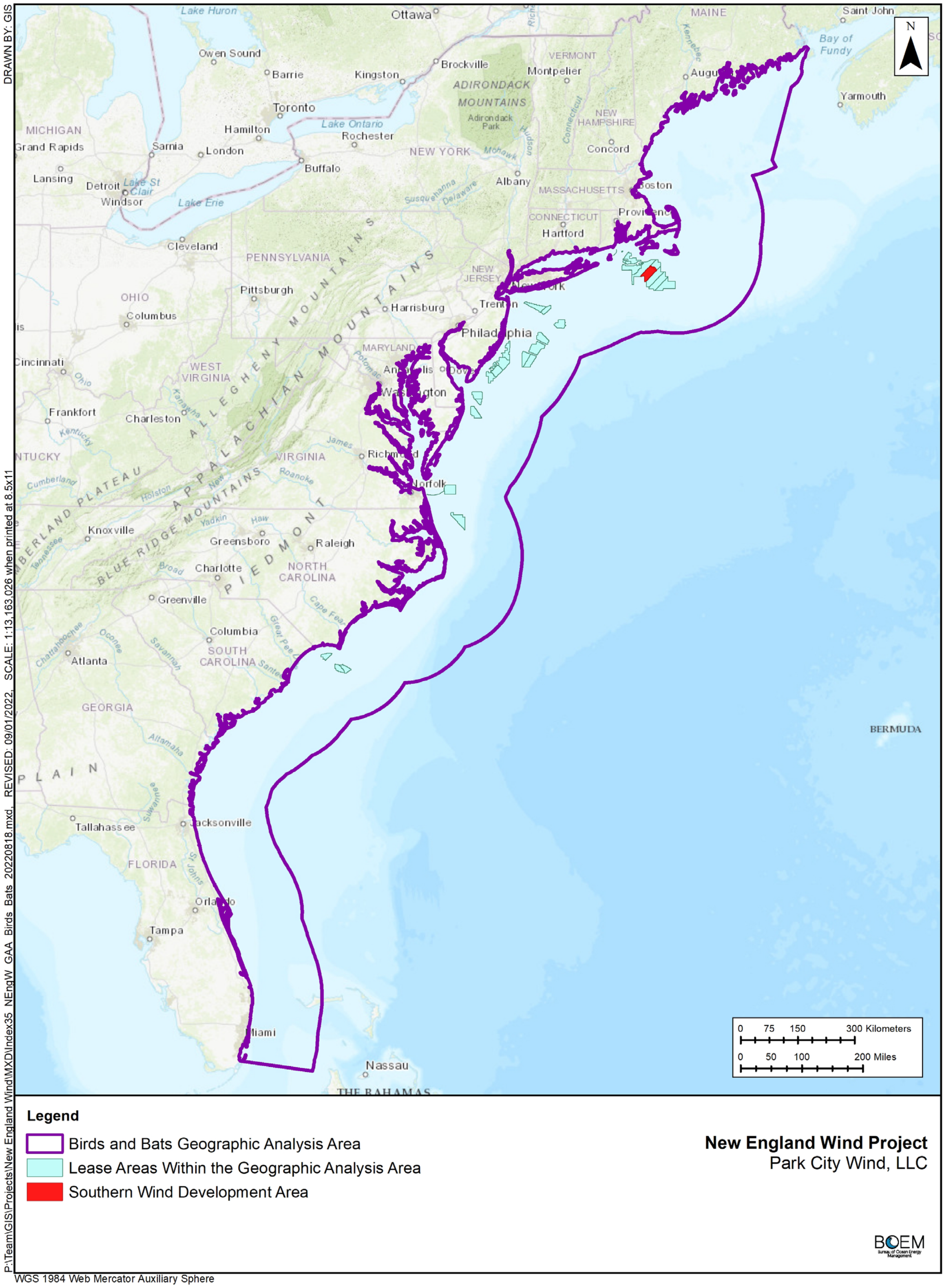


Figure G.2.4-1: Geographic Analysis Area for Birds

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 2023).

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).

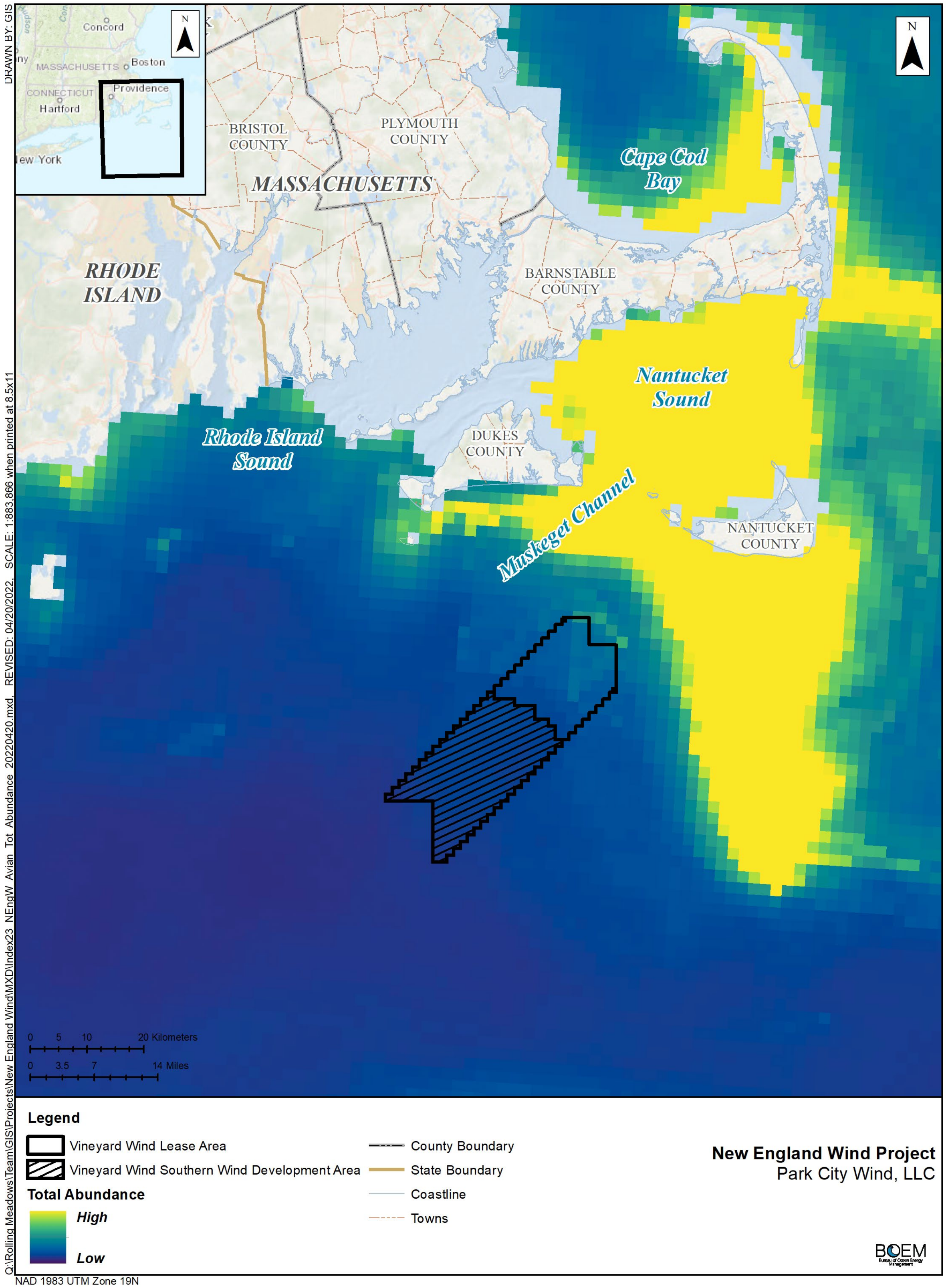
BOEM funds scientific studies and partners with the USFWS to better understand how migratory birds use the Atlantic OCS and refine the understanding of the risks from development to migratory species (BOEM Undated). BOEM uses information from these studies, coordination with the USFWS, and scientific 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 2023).

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 Type	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 existing conditions for birds (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.1-17).

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 birds 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 in Appendix E, 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 2023 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 3,037 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 2023 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 3,037 WTG and ESP foundations, which would entail 7,320 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 2023 and 2030 and beyond, and these structures would remain until decommissioning of each facility is complete, approximately 33 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 33-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 20,956 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 2023).

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

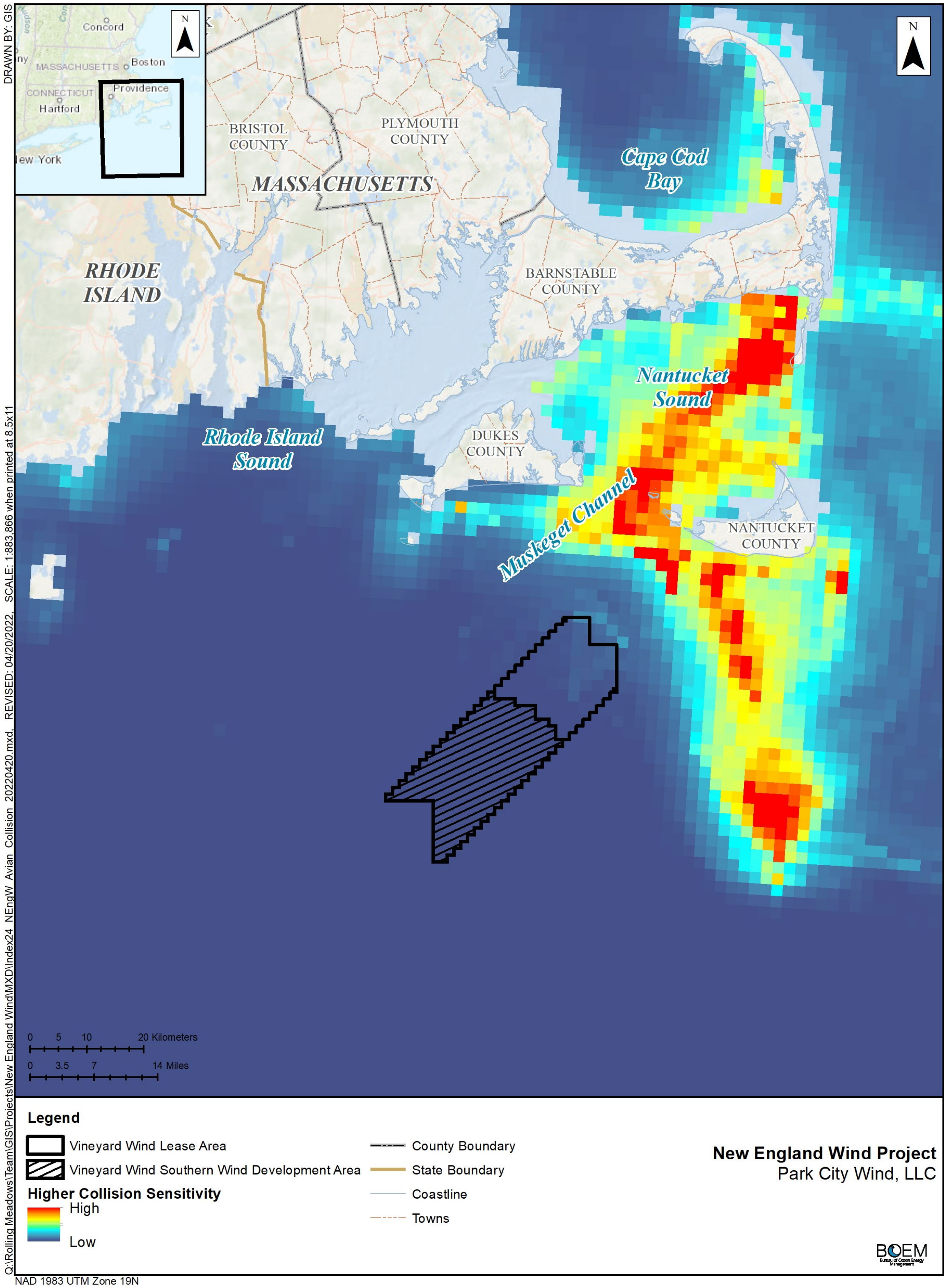
For Alternative A, the collision models predicted that 75 marine birds across the 12 modeled species would be killed each year. However, due to uncertainty in the data inputs (Table G.2.4-6), the modeled fatalities could be as high as 3,481 birds. Most of the variation in estimated fatalities is likely 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

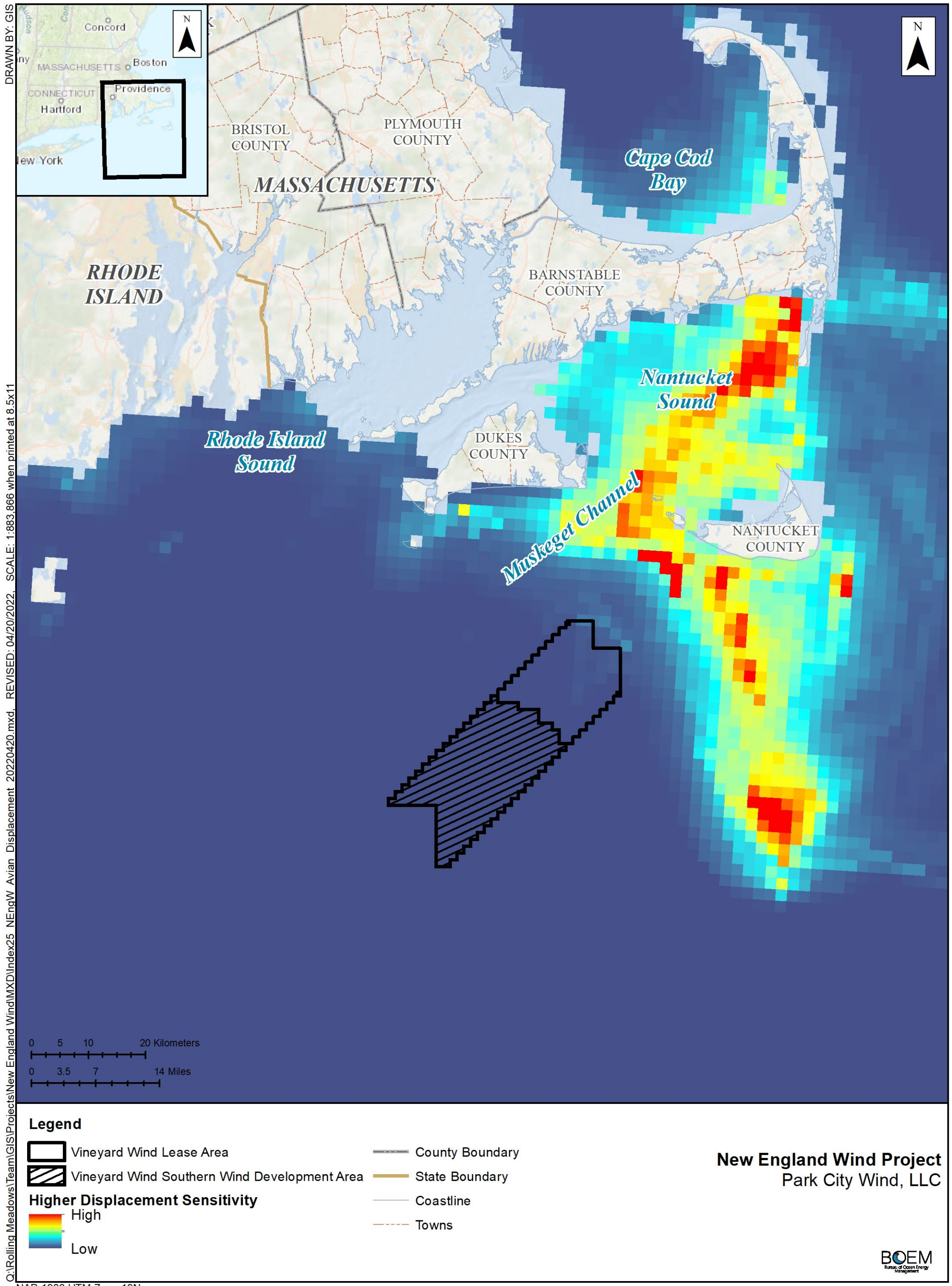
NA = not applicable
[a] This was calculated from the Avian Stochastic CRM (v2.3.2), using 12-MW turbines with 40-meter (131.2 foot) air gap. Output is from the Extended Model (Option 3). Monthly mean densities of flying birds were calculated across regional survey efforts.
[b] Fatality estimates are 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 potential impacts of Alternative A 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. 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 stages 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 2022a).

Impacts of Alternative B – Proposed Action on Birds

This section identifies potential impacts of Alternative B on birds. When analyzing the impacts of Alternative B on birds, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for 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 may include the following mitigation and monitoring measure to address impacts on birds, as described in detail in Table H-2 of EIS Appendix H. The Final EIS lists 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 2023).

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 2022a) 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 2023). 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 2023), only shearwaters, petrels, and gulls have the potential to encounter operating WTGs in the SWDA.

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 2023). 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 2023). 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 2023). 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 lists the mitigation and monitoring measures that BOEM would require as a condition of COP approval:

- Require the applicant to 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.

- Require the applicant to 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 2022a), Alternative B would have negligible impacts on Roseate Terns, Piping Plovers, and Red Knots (BOEM 2022a).

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 **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 be **moderate** and could potentially include **moderate** beneficial impacts. 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. The cumulative impacts of Alternative B 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. Potential **moderate** beneficial impacts may result from the presence of structures.

Impacts of Alternative C – Habitat Impact Minimization Alternative on Birds

When analyzing the impacts of Alternative C on birds, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for 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. Alternatives C-1 and C-2 would alter the exact routes of export cables through Muskeget Channel and could affect the exact length of cable installed and area of seafloor disturbed. These differences would not result in meaningfully different impacts compared to those of Alternative B. Therefore, the impacts of Alternatives C-1 and C-2 on birds would be the same as those for Alternative B: **minor** and **minor** beneficial. Cumulative impacts of Alternative C on birds would be **moderate** and **moderate** beneficial.

Impacts of the Preferred Alternative – Habitat Impact Minimization Alternative on Birds with the Western Muskeget Variant Contingency Option

Impacts on birds from the Preferred Alternative would be as follows:

- The Preferred Alternative cable alignment would be identical to Alternative C-1 (Scenario 1 for Phase 2) if the Western Muskeget Variant Contingency Option were not exercised, resulting in impacts from cable placement that would align with those described for Alternative C-1.
- The Preferred Alternative cable alignment would be identical to Alternative B (Scenario 2 for Phase 2) if the Western Muskeget Variant Contingency Option were exercised, resulting in impacts from the cable placement that would align with described for Alternative B.
- The Preferred Alternative would not allow for the co-location of ESPs at up to two locations, resulting in 130 WTG or ESP positions, as opposed to the potential of up to 132 WTG or ESP positions (Table H-2 in EIS Appendix H), as described under Alternative B. This would reduce the potential impacts on birds by a negligible increment for both Phase 1 and Phase 2, as there could be two fewer structures (WTGs or ESPs) potentially installed in the SWDA.

While the Preferred Alternative would slightly reduce the extent of adverse impacts on birds relative to Alternative B, the general scale, nature, and duration of impacts are comparable to those described for Alternative B. The Preferred Alternative would have **minor** impacts, both adverse and beneficial, on birds within the geographic analysis area. The cumulative impacts of the Preferred Alternative would be similar to those of Alternative B: **moderate**, both adverse and beneficial.

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, Coastal Habitats and Fauna, 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 Unites States. 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 2023) 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 2023).

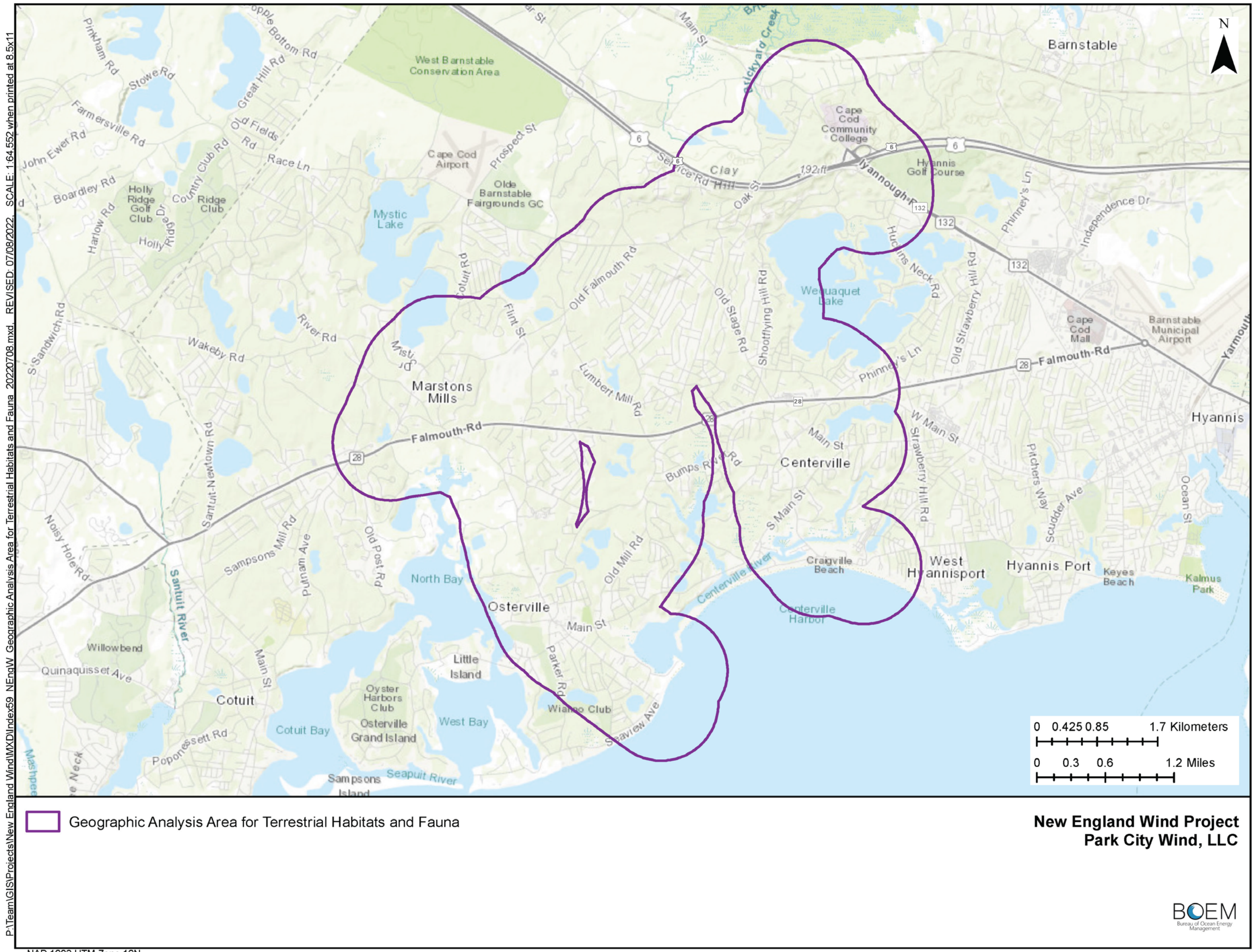


Figure G.2.5-1: Geographic Analysis Area for Terrestrial Habitats and Fauna

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 2023

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 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 2023), 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 2023). 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 **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 minor. Ongoing and planned activities would result in **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. 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. When analyzing the impacts of Alternative B on terrestrial habitats and fauna, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for 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 2023). 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 2023), 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 2023). 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 2023), 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 2023). 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. 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, if the SCV is selected. 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 2023). 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 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 **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 **moderate** 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. 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

When analyzing the impacts of Alternative C on terrestrial habitats and fauna, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for terrestrial habitats and fauna. Under Alternatives C-1 and C-2, onshore activities and impacts would be the same as those for Alternative B: **moderate**. Cumulative impacts of Alternative C on terrestrial habitats and fauna would be **moderate**. The impact ratings for Alternative C would align with those of Alternative B because any potential differences in the impacts associated with Alternative C would occur outside of the geographic analysis area for terrestrial habitat and fauna.

Impacts of the Preferred Alternative – Habitat Impact Minimization Alternative on Terrestrial Habitats and Fauna with the Western Muskeget Variant Contingency Option

Impacts on terrestrial habitats and fauna from the Preferred Alternative would align with those of Alternative B: **moderate**. Cumulative impacts of the Preferred Alternative on terrestrial habitats and fauna would be **moderate**. The impact ratings for the Preferred Alternative would align with those of Alternative B because any potential differences in the impacts associated with the Preferred Alternative would occur outside of the geographic analysis area for terrestrial habitat and fauna.

G.2.6 Non-Tidal Waters and Wetlands

G.2.6.1 Description of the Affected Environment

This section discusses the existing conditions of non-tidal waters and wetlands 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, which depicts the scope of where potential impacts may occur. The geographic analysis area for non-tidal waters and wetlands includes onshore development areas within the Cape Cod watershed (hydrologic unit code [HUC] 0109000202), as well as tidal waters within the U.S. Army Corps of Engineers (USACE) jurisdiction, which extends from the high tide line to the limits of the OCS. Certain non-tidal waters and wetlands are subject to USACE jurisdiction under Section 404 of the Clean Water Act (CWA). Under Section 404 of the CWA, USACE regulates the discharge of dredged or fill material into waters of the United States. The landward limit of jurisdiction in tidal waters (33 CFR § 328.4) extends to the high tide line, whereas the seaward limit is 3 nautical miles (3.5 miles), as measured from the baseline of the territorial seas. The USACE limits of jurisdiction in non-tidal waters are as follows:

- In the absence of adjacent wetlands, the jurisdiction extends to the ordinary high water mark.
- 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 United States consists only of wetlands, the jurisdiction extends to the limit of the wetland.

These marine environments within the geographic analysis area are included in the affected environment, and areas where potential impacts may occur are shown on Figure G.2.6-1 as a reflection of the full extent of where USACE jurisdiction may be, dependent upon the presence of non-tidal waters and wetlands. However, to avoid duplication of analysis this section focuses only on non-tidal waters and wetlands. Impacts on non-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. OCS 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 non-tidal waters and 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 2023). 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. Within the geographic analysis area, there are no non-tidal waters or wetland impacts that are subject to USACE jurisdiction.

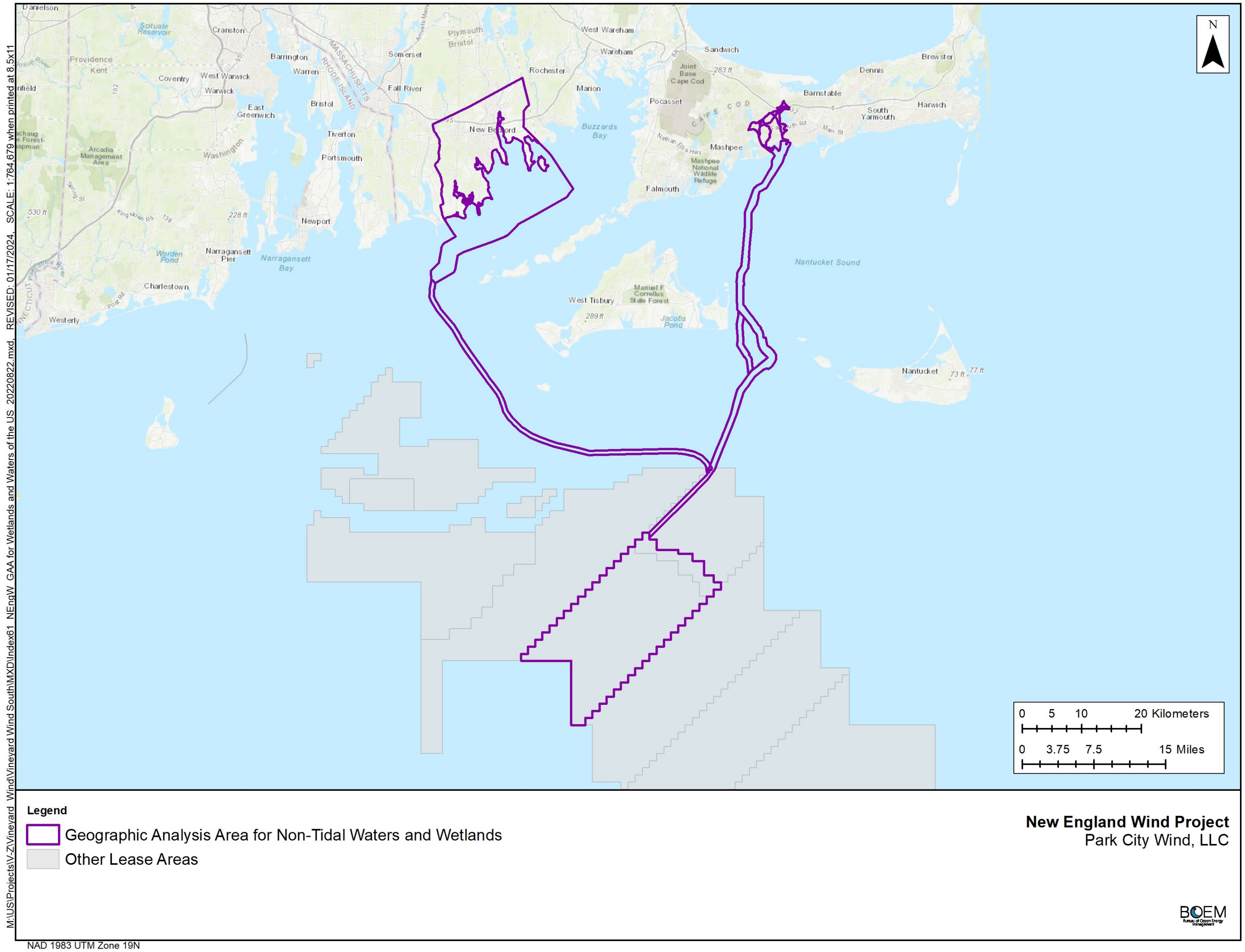


Figure G.2.6-1: Geographic Analysis Area for Non-Tidal Waters And Wetlands

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 non-tidal waters and wetlands. USACE defines wetland impacts differently than BOEM due to requirements under CWA Section 404 (as summarized below).

Table G.2.6-1: Impact Level Definitions for Non-Tidal Waters and Wetlands

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 Non-Tidal Waters and Wetlands

When analyzing the impacts of Alternative A on non-tidal waters and wetlands, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for non-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 non-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 non-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 non-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 non-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). Non-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 non-tidal waters and wetlands 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, climate change, and land disturbance. The potential impacts of Alternative A would be **minor**. Impacts on wetlands would be minimized and relatively small and localized. If impacts occur, wetlands would completely recover.

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. 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 Non-Tidal Waters and Wetlands

This section identifies potential impacts of Alternative B on non-tidal waters and wetlands. When analyzing the impacts of Alternative B on non-tidal waters and wetlands, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for 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 2023). 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 2023). 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). The applicant would also implement its OSRP (COP Appendix I-F; Epsilon 2023). 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 non-tidal waters and wetland resources. However, previously unidentified non-tidal waters and wetlands that are not found on publicly available maps may 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 CWA, as applicable; the MassDEP; and local regulations to prevent degradation of rivers and streams. 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 non-tidal waters and 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. However, similar to Phase 1, the Phase 2 onshore export and grid interconnection cables are expected to be installed underground primarily within public roadway layouts and utility ROW. Specialty trenchless crossing methods are expected to be used where these cables traverse wetlands and waterbodies to avoid impacts on those features. The impacts of the finalized SCV OECC and OECR route on non-tidal waters and wetlands will be evaluated in a supplemental NEPA analysis, if the SCV is selected.

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 non-tidal waters and wetlands through the primary IPFs of accidental releases and land disturbance. The cumulative impacts of all IPFs from ongoing and planned activities, including Alternative B, 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 **minor** 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. The overall cumulative impacts of Alternative B and other ongoing and planned activities on non-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 Non-Tidal Waters and Wetlands

When analyzing the impacts of Alternative C on non-tidal waters and wetlands, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for non-tidal waters and wetlands. Under Alternatives C-1 and C-2, all proposed onshore Project components and activities would align with those of Alternative B: **minor**. Cumulative impacts of Alternative C on non-tidal waters and wetlands would be **minor**. The impact ratings for Alternative C would align with those of Alternative B because any potential differences in the impacts associated with Alternative C would occur outside of the geographic analysis area for non-tidal waters and wetlands.

Impacts of the Preferred Alternative – Habitat Impact Minimization Alternative on Non-Tidal Waters and Wetlands with the Western Muskeget Variant Contingency Option

Impacts on non-tidal waters and wetlands from the Preferred Alternative would align with those of Alternative B: **minor**. Cumulative impacts of the Preferred Alternative on non-tidal waters and wetlands would be **minor**. The impact ratings for the Preferred Alternative would align with those of Alternative B because any potential differences in the impacts associated with the Preferred Alternative would occur outside of the geographic analysis area for non-tidal waters and wetlands.

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.

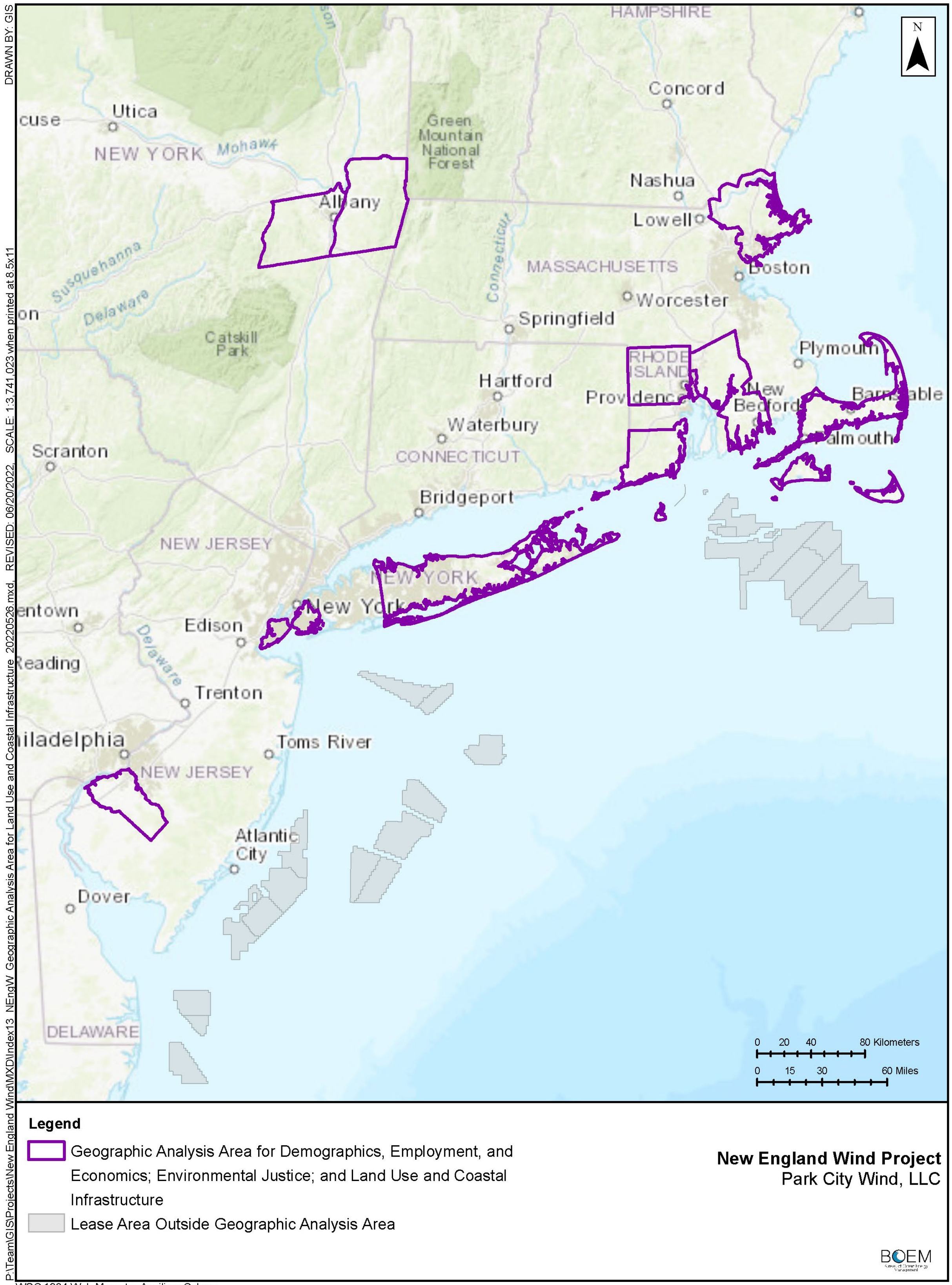


Figure G.2.7-1: Geographic Analysis Area for Land Use and Coastal Infrastructure

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 2023). 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 2023). 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) Brayton Point Commerce Center (P) 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) Port of Coeymans (E)
Kings County, New York	GMD Shipyard (E) South Brooklyn Marine Terminal (E)
Rensselaer County, New York	New York State Offshore Wind Port (P)
Richmond County, New York	Homeport Pier (P) Arthur Kill Terminal (G)
Suffolk County, New York	Shoreham site (P) Greenport Harbor (E)[b]
Providence County, Rhode Island	ProvPort (E) South Quay Terminal (G)
Washington County, Rhode Island	Port of Davisville (E)

Source: COP Volume III; Epsilon 2023

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 2023). 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 2023). 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 2023).

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 2023). 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 2023). 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 2023).

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 2023). 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 2023). 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 2023). 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 2023).

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 2023).

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 2023). 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 2023).

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 2023). 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 2023).

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 2023).

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 2023). 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 2023).

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 2023). 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 2023). 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 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 Vineyard Wind 1 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, which are not anticipated, but could affect a large land or coastal area and result in major impacts).

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. Under Alternative A, existing environmental trends and ongoing activities would continue, and land use and coastal infrastructure would continue to be affected by natural and human-caused IPFs. 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. BOEM anticipates that cumulative impacts of Alternative A would result in **minor** cumulative impacts, both adverse and beneficial, on land use and coastal infrastructure.

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 to the West Barnstable Substation 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 both Phase 1 and Phase 2, 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 2023). If proposed Project delays were to change this schedule, the impacts on roads and land uses during the busy tourist season would be exacerbated.

- 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. When analyzing the impacts of Alternative B on land use and coastal infrastructure, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for 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 construction 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 operations 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 2023). 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 2023).

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 2022a). 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 current 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 2023). 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

Road or ROW Used	Distance (miles)	Comments and Primary Adjoining Land Uses
Total Distance, Oak Street Route	**6.1**	
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 2023

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 approximately 15 months 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) (COP Volume I, Section 3.1.1.3; Epsilon 2023). 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. The applicant will generally limit installation of onshore duct bank and cables to typical work hours (7:00 a.m. to 6:00 p.m.) Monday through Friday. For 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 performed only on an as-needed basis, such as when crossing a busy road, and will be coordinated with the Town of Barnstable (COP Volume III, Section 4.2, Table 4.2-1; Epsilon 2023). 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 2023). 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 2023). 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 2023). 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 2023; 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 2023). 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 2023). 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 2023). 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 likely 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 2023). 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 lists 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 approximately 15 months 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) (COP Volume I, Section 3.1.1.3; Epsilon 2023).

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 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 be located within the paved parking area for the beach and pier. Installation of the landfall splice vault and cabling would disrupt the Dowses Beach parking lot during construction, while installation of 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 but would not occur during the peak summer season (COP Volume III, Section 4.2, Table 4.2-1; Epsilon 2023).

The OECR would connect from the Dowses Beach Landfall Site to East Bay Road by one of two possible routes: either following the access road from Dowses Beach to East Bay Road, or crossing East Bay via a trenchless installation method (COP Volume I, Section 4.2.2.1; Epsilon 2023). The Dowses Beach access road is paved, 18 to 20 feet wide, and crosses a causeway between East Bay and Phinney Bay. The cable would be installed above ground, along the top of a culvert, where a culvert under the road allows passage of water between the two bays. Comments dated November 28, 2022, from the Town of Barnstable to the Massachusetts Office of Energy and Environmental Affairs note several concerns with a cable route along the Dowses Beach access road, including the road's location in a high velocity ("VE") floodplain zone and a Category 1 hurricane surge zone; the effect of the cable conduit weight on the culvert's structural integrity; procedures for culvert maintenance, repair, and replacement if the cable conduit is attached to it; and added water flow resistance from the cable conduit, leading to potential redirected water flow, washout, and structural failure (Town of Barnstable 2022b). The Town of Barnstable requests study of the viability of the causeway and culvert to support the cable conduit, including modeling, peer review, and mitigations, if the Dowses Beach access road is selected.

Construction disturbances along the roads and utility ROW that form the remainder of the OECR would be temporary, lasting approximately 15 months for OECR installation (excluding the June through August peak tourist season); however, the applicant would complete construction at any one location along the OECR route in a shorter time period (days or weeks) (COP Volume I, Section 3.1.1.3; Epsilon 2023). Any construction activity from Memorial Day through Labor Day would require specific authorization from the Town of Barnstable (COP Volume III, Section 4.2, Table 4.2-1; Epsilon 2023). 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. BOEM assumes that the OECR would be designed pursuant to relevant building codes and industry standards and, thus, would not damage or cause difficulty in maintaining the causeway, culvert, and access road between East Bay Road and Dowses Beach. Overall, construction of Phase 2's Barnstable County landfall site and OECR, including the option for trenchless installation of the OECR under East Bay, would have localized, short-term, and minor impacts on land use and coastal infrastructure due to construction-related land disturbance and temporary access restrictions to the Dowses Beach parking lot.

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 NEPA filing.

The onshore substation site, onshore export cables, and splice vaults would be remotely monitored and require infrequent 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 (COP Volume III, Section 7.5.2.2.1; Epsilon 2023). 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. However, the 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 NEPA 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 due to port utilization. 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 projects occur in close spatial and temporal proximity. Impacts include 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 cumulative impacts 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

When analyzing the impacts of Alternative C on land use and coastal infrastructure, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on existing conditions for land use and coastal infrastructure. Under Alternatives C-1 and C-2, all proposed onshore Project components and activities would be the same as those of Alternative B: **minor** and **minor** beneficial. Cumulative impacts of Alternative C on land use and coastal infrastructure would also be **minor** and **minor** beneficial.

Impacts of the Preferred Alternative – Habitat Impact Minimization Alternative on Land Use and Coastal Infrastructure with the Western Muskeget Variant Contingency Option

Impacts on land use and coastal infrastructure from the Preferred Alternative would be the same as those of Alternative B: **minor** and **minor** beneficial. Cumulative impacts of the Preferred Alternative on land use and coastal infrastructure would also be **minor** and **minor** beneficial.

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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
applicant	Park City Wind LLC
ASR	airport surveillance radar
BO	Biological Opinion
BOEM	Bureau of Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement
CFR	Code of Federal Regulations
COP	Construction And Operations Plan
CR	Conservation Recommendation
CZM	Office of Coastal Zone Management
dB	decibel
DMA	dynamic management area
DTS	distributed temperature sensing
EIS	environmental impact statement
EFH	essential fish habitat
ESA	Endangered Species Act
ESP	electrical service platform
FL	Florida
GARFO	Greater Atlantic Regional Fisheries Office
HAPC	habitat area of particular concern
HDD	horizontal directional drilling
HESD	Habitat and Ecosystem Services Division
HH:MM	hour:minute
HRG	high-resolution geophysical
Hz	hertz
ID	identification
ISO	International Organization for Standardization
ITA	Incidental Take Authorization
ITS	Incidental Take Statement
kHz	kilohertz
kJ	kilojoule
LOA	Letter of Authorization
m/s	meters per second
MassDEP	Massachusetts Department of Environmental Protection
ME	Maine
MEC	munitions and explosives of concern
MMPA	Marine Mammal Protection Act
NA	not applicable
NARW	North Atlantic right whale
NAS	noise attenuation system
NC	North Carolina
NEFOP	Northeast Fisheries Observer Program
NEFSC	Northeast Fisheries Science Center
NHESP	Natural Heritage and Endangered Species Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OCS	Outer Continental Shelf
OECC	offshore export cable corridor
OPR	Office of Protected Resources
PAM	passive acoustic monitoring
PATON	private aid to navigation

PPPP	Piping Plover Project Plan
Project	New England Wind Project
PSO	protected species observer
ROD	Record of Decision
RPM	Reasonable and Prudent Measure
SAR	search and rescue
SAV	submerged aquatic vegetation
SBM	subbottom profiler
SEL	sound exposure level
SELss	single strike sound exposure level
SFV	sound field verification
SMA	seasonal management area
SPL	sound pressure level
SPLpk	peak sound pressure level
SPLrms	root-mean-square sound pressure level
SWDA	Southern Wind Development Area
TMP	traffic management plan
TSHD	trailing suction hopper dredge
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
UTC	Universal Time Coordinated
UXO	unexploded ordnance
VA	Virginia
VHF	very high frequency
Vineyard Wind 1	Vineyard Wind 1 Project
WTG	wind turbine generator
Y/N	yes/no
YY-MM-DDT	Year-Month-Day Time Zone
YYYY-MM-DD	Year-Month-Day

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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, the Final 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 2023).

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, 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 approves the COP, the ROD will state which of the additional mitigation and monitoring measures in Tables H-1 and H-2 have been adopted. Any mitigation measures analyzed in the impact analysis of the selected alternative, and that influenced the impact determinations under that alternative, will be adopted. 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).

[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).

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 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 construction management plan that will be used by the applicant and its contractors during construction. The construction management plan 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 (30 meters) 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.	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: • Acoustic monitoring for birds and bats; • Installation of Motus receivers on WTGs in the SWDA and support with upgrades or maintenance of two onshore Motus receivers; • 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; • Pre- and post-construction boat surveys; • Avian behavior point count surveys at individual WTGs; and • 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. The applicant will work with BOEM to ensure the data is publicly available.	Bats (G.2.3); Birds (G.2.4)
9.	Aircraft detection lighting system	The applicant has committed to use Federal Aviation Administration -approved aircraft detection lighting system, which will only activate the Federal Aviation Administration 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)
10.	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 2023), based on the framework prepared for Vineyard Wind 1.	Benthic Resources (3.4)
11.	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)
12.	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)
13.	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)
14.	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)
15.	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 2023). 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 (*Charadrius melodus*) during the breeding season.	Birds (G.2.4)
16.	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: • 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 U.S. Fish and Wildlife Service, and BOEM must be notified with the reason, anticipated duration of the work, and any additional information requested by NHESP, the U.S. Fish and Wildlife Service, and BOEM. • 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)
17.	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. 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. 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: • 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; • 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 • 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)
18.	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)
19.	Oil spill response plan	The applicant will develop an oil spill response plan (COP Appendix I-F; Epsilon 2023).	Coastal Habitats and Fauna (3.5); Water Quality (G.2.2)
20.	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)
21.	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. 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)
22.	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)
23.	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)
24.	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)
25.	Pile-driving noise attenuation	The applicant will implement noise attenuation mitigation to reduce sound levels by a target of approximately 12 dB 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)

<table>
<tr><th>Measure Number</th><th>Measure Title</th><th>Measure Description</th><th>Resource Area Addressed (EIS Section)</th></tr>
<tr><td>26.</td><td>Visual and PAM monitoring during UXO detonations (vessel-based)</td><td>Two PSOs will visually survey the UXO clearance zone at least 60 minutes prior to a detonation event, during the event, and for 30 minutes after the event. PAM monitoring will be conducted during UXO detonations and will begin at least 60 minutes prior to UXO detonations and extend at least 30 minutes after the event.</td><td>Marine Mammals (3.7); Sea Turtles (3.8)</td></tr>
<tr><td>27.</td><td>Time -of-day restrictions for UXO detonations</td><td>No UXO will be detonated during nighttime hours and only one detonation may occur in a 24-hour period.</td><td>Marine Mammals (3.7); Sea Turtles (3.8)</td></tr>
<tr><td>28.</td><td>Pre-start clearance for UXO detonations</td><td>A 60-minute pre-start clearance period will be implemented prior to any in-situ UXO detonations. The clearance zone must be fully visible for at least 30 minutes prior to commencing detonation. All marine mammals must be confirmed to be out of the clearance zone prior to initiating detonation. If a marine mammal is observed entering or within the relevant clearance zones prior to the initiation of detonation, the detonation must be delayed. The detonation may commence when either the marine mammal(s) has voluntarily left the respective clearance zone and been visually confirmed beyond that clearance zone, or when 30 minutes have elapsed without redetection for whales, including the NARW (Eubalaena glacialis), or when15 minutes have elapsed without redetection of dolphins, porpoises, and seals.</td><td>Marine Mammals (3.7); Sea Turtles (3.8)</td></tr>
<tr><td>29.</td><td>UXO clearance zones</td><td>The clearance zones for a UXO detonation are provided below (JASCO 2023):
<table>
<tr><th>Hearing Group</th><th>UXO Visual and PAM Clearance Zone (meters)</th><th>UXO PAM Zones (meters)</th></tr>
<tr><td>Low-frequency cetacean</td><td>3,800</td><td>11,900</td></tr>
<tr><td>Mid-frequency cetacean</td><td>650</td><td>2,550</td></tr>
<tr><td>High-frequency cetacean</td><td>6,200</td><td>14,100</td></tr>
<tr><td>Phocid pinniped in water</td><td>1,600</td><td>7,020</td></tr>
</table></td><td>Marine Mammals (3.7); Sea Turtles (3.8)</td></tr>
<tr><td>30.</td><td>Noise attenuation for UXO detonations</td><td>The applicant will use a dual noise mitigation system for all detonation events and is committed to achieving the modeled ranges associated with 10 dB of noise attenuation.</td><td>Marine Mammals (3.7); Sea Turtles (3.8)</td></tr>
<tr><td>31.</td><td>Work zones</td><td>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.</td><td>Terrestrial Habitats and Fauna (G.2.5); Land Use and Coastal Infrastructure (G.2.7)</td></tr>
<tr><td>32.</td><td>Offshore markings and coordination</td><td>To minimize hazards to navigation, all proposed Project-related vessels and equipment will display the required marine navigation lighting and day shapes.
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.
The applicant is currently providing and will continue to provide portable digital media with electronic charts depicting locations of proposed Project-related activities.</td><td>Commercial Fisheries and For-Hire Recreational Fishing (3.9); Navigation and Vessel Traffic (3.13); Recreation and Tourism (3.15)</td></tr>
<tr><td>33.</td><td>Aids to navigation</td><td>Each proposed Project WTG and ESP will be maintained as a private aid to navigation in accordance with USCG's private aid to navigation marking guidance for offshore wind facilities.
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.
Mariner radio activated sound system and automatic identification system 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.</td><td>Commercial Fisheries and For-Hire Recreational Fishing (3.9); Navigation and Vessel Traffic (3.13); Recreation and Tourism (3.15)</td></tr>
<tr><td>34.</td><td>Marine coordination</td><td>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.).</td><td>Commercial Fisheries and For-Hire Recreational Fishing (3.9); Navigation and Vessel Traffic (3.13); Recreation and Tourism (3.15)</td></tr>
<tr><td>35.</td><td>Funding for fisheries research and education</td><td>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.
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.</td><td>Commercial Fisheries and For-Hire Recreational Fishing (3.9); Demographics, Employment, and Economics (3.11); Environmental Justice (3.12)</td></tr>
<tr><td>36.</td><td>Avoid identified shipwrecks, debris</td><td>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.</td><td>Cultural Resources (3.10)</td></tr>
</table>

Measure Number	Measure Title	Measure Description	Resource Area Addressed (EIS Section)
	fields, and submerged landform features that can be avoided		
37.	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)
38.	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)
39.	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 National Historic Preservation Act Section 106 process.	Cultural Resources (3.10); Recreation and Tourism (3.15); Visual Resources (3.16)
40.	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 2023) to help avoid potential fishing gear interactions.	Commercial Fisheries and For-Hire Recreational Fishing (3.9); Demographics, Employment, and Economics (3.11)
41.	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)
42.	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. 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)
43.	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)
44.	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. 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)
45.	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. 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)
46.	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)

Measure Number	Measure Title	Measure Description	Resource Area Addressed (EIS Section)
Proposed Mitigation, Monitoring, and Reporting Measures in the MMPA Letter of Authorization Application[a]			
47.	Seasonal Restrictions on Pile Driving Activities	Historical and anticipated NARW presence will be used to inform a time of year restriction on pile driving that will minimize the amount of pile driving that occurs when the migratory NARW is likely to be in the Offshore Development Area and will thus limit sound exposure for this endangered species. The applicant expects to establish a restriction on pile driving activities (i.e., impact pile driving, vibratory driving, and drilling) between January 1 and April 30. The seasonal restriction would also have a protective effect for other marine mammal species. There is no seasonal restriction applied to HRG surveys and potential detonation of UXO.	Marine Mammals (3.7)
48.	NAS	Several hypothetical broadband attenuation levels (0, 10, and 12 dB) were included in the modeling of impact pile driving for comparison purposes. When calculating takes from impact pile driving, impacts to marine mammals were conservatively assessed based on 10 dB of noise attenuation. However, the applicant expects to implement noise attenuation technology to reduce sound levels by a target of 12 dB or greater, so exposure and range estimates for this activity show both values for comparison. Pile driving sound attenuation technology under consideration for the project includes piling equipment that is optimized for sound reduction (e.g., Integrated Pile Installer), underwater noise abatement systems (e.g., AdBm Technologies encapsulated bubble sleeve), and/or bubble curtains. The applicant will use two NASs during pile driving (e.g., two bubble curtains, one bubble curtain and one AdBm Technologies encapsulated bubble sleeve, etc.) for monopile installation and up to two NASs for jacket installation. The applicant will also use NAS for all UXO detonation events and is committed to achieving a minimum of 10 dB of attenuation. Although the take request only reflects estimates assuming NAS during impact pile driving and potential detonation of UXO, the applicant also intends to use NAS during all vibratory driving and drilling activity.	Marine Mammals (3.7)
49.	Establishment of Protective Zones during Pile Driving: Impact Pile Driving	The applicant's proposed clearance and shutdown zones are discussed in 11.3.1 of the LOA application, and the proposed clearance and shutdown zones for marine mammals are provided in Tables 65 and 66 of the LOA application. The proposed visual clearance and shutdown zones and PAM clearance and shutdown zones are provided in Table 67 of the LOA application (JASCO 2022).	Marine Mammals (3.7)
50.	Establishment of Protective Zones during Vibratory Setting and Drilling	Protective zones have also been established for vibratory setting and drilling activity during pile installation. The species-specific shutdown and clearance zones for vibratory setting and drilling activity are provided in Table 68 of the LOA application (JASCO 2022). Mitigation zones implemented during construction activity may be modified, with NMFS approval, based on received sound level measurements during piling operations.	Marine Mammals (3.7)
51.	Establishment of Protective Zones during UXO detonation	Protective zones will be established to minimize and avoid potential impacts of underwater sound to marine mammals during UXO detonation. The proposed visual and PAM clearance zones as well as ranges to temporary threshold shift onset thresholds for marine mammal hearing groups are provided in Table 69 of the LOA application (JASCO 2022).	Marine Mammals (3.7)
52.	Establishment of Protective Zones during HRG Surveys	Visual and acoustic monitoring of clearance and shutdown zones during pile driving and HRG surveys will be conducted by NMFS-approved PSOs, and the final requirements and data sharing will be determined in collaboration with BOEM and NOAA Fisheries. Clearance Zone • Clearance zones will be monitored around the center of the acoustic sources for marine mammals. • Clearance zones will be monitored for all listed species for 30 minutes to ensure that no marine mammals are present before any compressed high-intensity radiated pulse subbottom profilers, boomer or sparker sources are initiated. • The following clearance zones will be implemented during operations of boomer or sparker sources: ○ 500 meters (656 feet) for all listed species ○ 100 meters (328 feet) for other marine mammals • The clearance zones must be visible to the naked eye or using appropriate visual technology during the entire clearance period before commencing operations of boomers and sparkers. • If any marine mammal is observed within the clearance zones during the 30-minute clearance period, ramp-up will not begin until the animal(s) is/are observed exiting the clearance zones, or until an additional time period has elapsed with no further sightings (i.e., 15 minutes for small odontocetes and • 30 minutes for all other species). Shutdown Zone • Shutdown zones will be monitored around the center of the sources for marine mammals. • The following shutdown zones will be implemented during all HRG survey activities: ○ 500 meters (656 feet) for NARWs; ○ 100 meters (328 feet) for all other marine mammal species; and ○ No shutdown zones for certain delphinids.	Marine Mammals (3.7)
53.	Ramp-up/Soft-Start Procedures: Pile Driving	A ramp-up (i.e., soft-start) will be used at the commencement of pile driving activity to provide additional protection to marine mammals potentially located near the construction effort. The following, additional soft-start procedures will be performed at the start of impact pile driving: • Soft-start will not begin until the clearance zone has been cleared by the visual PSOs or PAM operators, when appropriate. • Each soft-start will last for a minimum of 20 minutes. • A soft-start will also be implemented if piling is halted for 30 minutes or longer during installation.	Marine Mammals (3.7)

Measure Number	Measure Title	Measure Description	Resource Area Addressed (EIS Section)
		• If any marine mammal is detected within the applicable shutdown zone during the soft-start, activities will be delayed until the animal is observed leaving the shutdown zone or until 30 minutes have passed without a detection of the animal within the shutdown zone.	
54.	Ramp-up/Soft-Start Procedures: HRG Surveys	Ramp-up will not be initiated during periods of inclement conditions or if the clearance zone cannot be adequately monitored by PSOs using appropriate visual technology for a 30-minute period. • A ramp-up begins with the powering up of the smallest acoustic HRG equipment at its lowest power output. When technically feasible the power is then gradually turned up and other acoustic sources added such that the source level increases gradually. • PSOs will stand-watch for a minimum of 30 minutes to ensure the clearance zones are clear of marine mammals prior to commencement of ramp-up procedures. If a marine mammal is observed, ramp-up may not begin until the marine mammal has exited the clearance zone or until the following additional time periods have elapsed with no further sightings: ○ 30 minutes for NARW and other non-delphinid cetaceans; and ○ 15 minutes for delphinid cetaceans and pinnipeds.	Marine Mammals (3.7)
55.	Vessel Strike Avoidance Measures	The applicant will adhere to legally mandated vessel speeds, approach limits, and other vessel strike avoidance measures to reduce the risk of impact to NARWs as a result of the applicant activities in the SWDA. For example, federal regulations require that vessels maintain a separation distance of 457 meters (1,500 feet) from an observed NARW (see 50 CFR § 224.103 (c)). As safe and practicable, the applicant's vessels operating in the SWDA will also follow NOAA guidelines for vessel strike avoidance, including vessel speed restrictions and separation distances, that are applicable at the time of construction. During appropriate time periods and within certain areas (described in Section 4.1.5.3), the applicant-related vessels traveling to/from Salem Harbor will transit at 18.4 kilometers per hour (10 knots) or less within NOAA-designated NARW critical habitat and outside critical habitat. Regardless of the guidance in effect at the time of construction, vessel operators and crew will maintain a vigilant watch for marine mammals, and will slow down or maneuver their vessels, as appropriate, to avoid a potential interaction with a marine mammal. Vessels will also maintain required separation distances, which will be monitored by trained observers or PSOs. The applicant personnel will check the NMFS' NARW reporting systems on a daily basis. Additionally, it is expected that vessel captains will monitor USCG very high frequency Channel 16 throughout the day to receive notifications of any sightings. This information would be used to alert the team to the presence of a NARW in the area and to implement mitigation measures as appropriate. Whenever multiple Project vessels are operating, all sightings of listed species will be communicated between vessels to all PSOs.	Marine Mammals (3.7)
56.	Avoidance Measures during HRG Surveys	• All vessel operators and crews will maintain a vigilant watch for marine mammals at all times, and slow down or stop their vessel to avoid striking protected species, except under extraordinary circumstances when complying with this requirement would jeopardize the safety of the vessel or crew. • Monitoring of a 500 meters (1,640 feet) vessel strike avoidance zone may be performed by PSOs or crew members, however, any crew members responsible for monitoring will be trained to broadly identify protected species and marine mammals, such as the NARW or other whale species. • All vessel operators will reduce vessel speed to 10 knots (5.1 m/s) or less when mother/calf pairs, pods, or larger assemblages of marine mammals are observed near an underway vessel. • All vessel operators will comply with 10 knots (5.1 m/s) speed restrictions in any dynamic management area. • The applicant will monitor NMFS NARW reporting systems from November 1 through July 31 and whenever a dynamic management area is established within any areas vessels operate. • When marine mammals are sighted while a vessel is underway, the vessel shall take action 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, reduce speed and shift the engine to neutral). This does not apply to any vessel towing gear or any vessel that is navigationally constrained. NARWs and ESA-listed marine mammals: • The applicant will ensure all vessels maintain a separation distance of 500 meters (1,640 feet) or greater from any sighted NARW and other ESA-listed marine mammals. • The applicant will ensure that the following avoidance measures are taken if a vessel comes within 500 meters (1,640 feet) of any NARW. ○ If underway, any vessel will steer a course away from any NARW at 10 knots (5.1 m/s) or less until the 500 meters (1,640 feet) minimum separation distance has been established, unless: – If a NARW is sighted within 100 meters (328 feet) to an underway vessel, the vessel operator must immediately reduce speed and promptly shift the engine to neutral. The vessel operator must not engage the engines until the NARW has moved beyond 100 meters (328 feet), at which point the vessel will steer a course away from any NARW at 10 knots (5.1 m/s) or less until the 500 meters (1,640 feet) minimum separation distance has been established. – If a vessel is stationary, the vessel will not engage engines until the NARW has moved beyond 100 meters (328 feet), at which point the vessel will steer a course away from any NARW at 10 knots (5.1 m/s) or less until the 500 meters (1,640 feet) minimum separation distance has been established. Non-ESA-listed whales: • The applicant will ensure that all vessels maintain a separation distance of 100 meters (328 feet) or greater from any sighted non-ESA-listed whales. • The following avoidance measures are taken if a vessel comes within 100 meters (328 feet) of any non-delphinid cetacean: ○ If underway, the vessel must reduce speed and shift the engine to neutral and must not engage the engines until the whale has moved beyond 100 meters (328 feet). ○ If stationary, the vessel must not engage engines until the whale has moved beyond 100 meters (328 feet). Delphinid cetaceans and pinnipeds: • The applicant will ensure that: ○ All vessel underway will not divert to approach any cetaceans or seals. ○ When feasible, all vessels will maintain a separation distance of 50 meters (164 feet) or greater from any sighted delphinid cetacean or pinniped. ○ All vessels underway will remain parallel to a sighted delphinid cetacean's or pinniped's course whenever possible and avoid excessive speed or sudden changes in direction. If a delphinid(s) is visually detected approaching the vessel or towed survey equipment (e.g., to bow ride), the PSOs and crew will use professional judgement in making course and/or speed adjustments ○ All vessels underway reduce vessel speed to 10 knots or less when pods (including mother/calf pairs) or large assemblages of delphinid cetaceans are observed. ○ If a whale is observed that cannot be confirmed to species, the vessel operator must assume that it is an ESA-listed species and take appropriate action.	Marine Mammals (3.7)

Measure Number	Measure Title	Measure Description	Resource Area Addressed (EIS Section)
		○ The requirements listed in this section do not apply if compliance would create imminent and serious threat to a person or vessel.	
57.	Potential UXO Detonations Protocols	UXO detonation may be required during construction and installation of the Project if other, preferable removal options (see Section 1.2.4) are not feasible. The exact number and type of UXOs that may be encountered in the project area are not yet known, but for the purpose of this LOA request it is assumed that up to 10 E12-bin UXOs may need to be detonated in place. The following mitigation measures will be implemented in the event that an UXO detonation is necessary. • Only one detonation may occur in a 24-hour period. • Detonations will only occur during daylight hours. • A 60-minute pre-start clearance period will be implemented prior to any in-situ UXO detonation. The clearance zone (see Table 69) must be fully visible for at least 30 minutes prior to commencing detonation. • All marine mammals must be confirmed to be out of the clearance zone prior to initiating detonation. • If a marine mammal is observed entering or within the relevant clearance zones prior to the initiation of detonation, the detonation must be delayed. • The detonation may commence when either the marine mammal(s) has voluntarily left the respective clearance zone and been visually confirmed beyond that clearance zone, or when 30 minutes have elapsed without redetection for whales, including the NARW, or 15 minutes have elapsed without redetection of dolphins, porpoises, and seals.	Marine Mammals (3.7)
58.	HRG Mitigation Protocols	HRG surveys may be required during construction and installation of the Project. Survey operations may be conducted over 24-hour periods. To provide survey flexibility, the specific locations and amount of survey vessels will be determined at the time of contractor selection. Mitigation measures implemented during HRG surveys for sources operating at or below 180 kilohertz can decrease the potential impacts to marine mammals from sound exposure by reducing the distance to disturbance and therefore the likelihood of Level B sound exposures. The applicant will comply with all applicable monitoring and mitigation regulations and any lease or permit conditions placed on the Project by regulatory agencies. The applicant is proposing the mitigation measures, provided in Table 70, to reduce the potential for negative impacts to marine mammals during survey acquisition; however, the final mitigation plan will be determined in consultation with NMFS. The selection of appropriate mitigation techniques will consider safety, effectiveness for the Project, and practical application of individual measures, as well as all measures in-concert. Shutdown Procedures • An immediate shutdown of HRG survey equipment specified in the Incidental Harassment Authorization permit will be required if a marine mammal is detected at or within its respective shutdown zone. • The vessel operator must comply immediately with any call for shutdown by the PSO. • Any disagreement between the PSO and vessel operator should be discussed only after shutdown has occurred. • HRG survey equipment may be allowed to continue operating if dolphins voluntarily approach the vessel (e.g., to bow ride) when the sound sources are at full operating power. • If a species approaches or enters the Level B harassment zone, shutdowns will occur if a marine mammal authorization has not been granted, or, an authorized species' takes have already been met. • If HRG survey equipment is shutdown longer than 30 minutes while PSOs have been monitoring, clearance followed by ramp-up activities will commence. • If another marine mammal enters a shutdown zone during the shutdown period, the HRG equipment may not restart until that animal is confirmed outside the respective exclusion or until the appropriate time has passed from the last sighting of the marine mammal. • After shutdown, ramp-up can be initiated once the shutdown zone are visually clear for the respective clearance timing. • Shutdown is not required for small delphinids from genera *Delphinus*, *Lagenorhynchus*, *Stenella*, and *Tursiops* that are detected voluntarily approaching the vessel or towed equipment. • If a PSO is unsure about the identification of a small delphinid, PSOs must use their professional judgement to decide as to whether shutdown should occur. Pauses in HRG Sources • If the acoustic source is shut down for reasons other than mitigation (e.g., mechanical difficulty) for less than 30 minutes, it may be re-activated without ramp-up only if PSOs have maintained constant observation and no detections of any marine mammal have occurred within the respective shutdown zone. • Any shutdown exceeding 30 minutes must be followed by full ramp-up procedures.	Marine Mammals (3.7)
59.	PSO and Trained Observer	As noted above, the applicant will use NMFS-approved PSOs to monitor clearance and shutdown zones during pile driving and HRG survey activity as well as any UXO detonation. PSOs will use visual aids (e.g., range finders, binoculars, night vision devices, infrared/thermal camera) when necessary. PSOs will have no tasks other than to conduct observations, collect and report data, and communicate with and instruct relevant vessel crew regarding the presence of marine mammals and mitigation requirements.	Marine Mammals (3.7)
60.	Equipment and Technology	The applicant will consider the best commercially available equipment and technology for minimizing and avoiding impacts to marine mammals during construction and installation. This includes a variety of marine mammal detection and sound mitigation methodologies. Examples of potential technologies include PAM recorders, thermal cameras, and NAS. The applicant may collaborate with BOEM and NMFS to integrate practicable technology choices in mitigation equipment to meet the necessary standards for permitting and successful consultations. The applicant expects to use a PAM system to support visual monitoring of mitigation zones. The exact specifications of the PAM system, the software to be used, and the monitoring protocol will be identified prior to construction and in consultation with BOEM and NOAA Fisheries.	Marine Mammals (3.7)
61.	Environmental Training	All The applicant personnel working offshore will receive standardized environmental awareness training, which will stress individual responsibility for marine mammal and marine debris awareness and reporting. Prior to commencing offshore activities associated with either construction or HRG surveys, team members participate in induction meetings where summary materials are presented in person and with video materials covering topics including the following: • Code of Business Conduct including environmental commitments, • Relevant regulatory statutes, laws, and permit requirements, • Specific conditions and procedures related to offshore activities, e.g., marine debris protocols, marine mammal monitoring and mitigation, spill reporting, etc., • Protected species and trained crew observers procedures for sighting, reporting and protection of species including vessel strike avoidance and sound source management,	Marine Mammals (3.7)

Measure Number	Measure Title	Measure Description	Resource Area Addressed (EIS Section)
		• Protected species identification, and • Communication protocols. All personnel are required to register their participation in the induction training. These records are auditable. Additional refresher training related to the protected species monitoring and mitigation plan is provided offshore, and individuals joining the project who did not attend the initial induction training will be required to participate in a separate training session, with their participation recorded for the project. Environmental Management Plans will be created for construction operations and HRG surveys. The Environmental Management Plan includes all of the induction training components, including full copies of relevant permits and permit-required plans, protected species identification materials, communication flow charts and contact information, etc. These materials are all retained in accessible areas on all project vessels.	

[a] More information can be referenced from the applicants MMPA LOA application (JASCO 2022).
applicant = Park City Wind LLC; BOEM = Bureau of Ocean Energy Management; CFR = Code of Federal Regulations; COP = Construction and Operations Plan; dB = decibel; EIS = environmental impact statement; ESA = Endangered Species Act; ESP = electrical service platform; HDD = horizontal directional drilling; HRG = high-resolution geophysical; LOA = Letter of Authorization; m/s = meters per second; MMPA = Marine Mammal Protection Act; NARW = North Atlantic right whale; NAS = noise attenuation system; NHESP = Natural Heritage and Endangered Species Program; NMFS = National Marine Fisheries Service; NOAA = National Oceanic and Atmospheric Administration; OECC = offshore export cable corridor; PAM = passive acoustic monitoring; PPPP = Piping Plover Project Plan; Project = New England Wind Project; PSO = protected species observer; SWDA = Southern Wind Development Area; TMP = traffic management plan; USCG = U.S. Coast Guard; UXO = unexploded ordnance; Vineyard Wind 1 = Vineyard Wind 1 Project; 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 (*Myotis septentrionalis*) are documented, this measure may not be necessary for ESA compliance relative to the species.	Bats (G.2.3)	BOEM BSEE
2.	Operations	Acoustic bat detectors	The applicant will deploy acoustic bat detectors on the nacelle and foundation of six WTGs for a duration of up to 3 years post-construction 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 BOEM and USFWS and will be finalized in the proposed Project's post-construction avian and bat monitoring plan.	Bats (G.2.3)	BOEM BSEE
3.	Construction, Operations, Decommissioning	Optical surveys of benthic invertebrates and habitat	The applicant will conduct optical drop camera surveys per the proposed Project's final fisheries monitoring plan. Stations will be placed on a 0.9-mile (1.5-kilometer) grid, with four quadrats sampled at each state twice per year between April and September. The drop camera surveys emulate the drop camera survey conducted in Lease Areas OCS-A 0501 and 0534 in 2012, 2013, and 2019 through 2022 (Bethoney et al. 2020) to support a before-after control impact study design. 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. The applicant will consult with NMFS and BOEM prior to conducting inspections and address 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. Additionally, the applicant will inspect scour protection performance as part of its operations and maintenance plan. Underwater inspections of foundations and scour protection will be performed by remotely operated vehicles or other techniques. Underwater inspections will be conducted for 20% of foundations each year during the first 5 years of operations (i.e., all foundations are expected to be inspected once during the first 5 years). After the first 5 years of operations, the frequency of surveys may be adjusted over time based on results.	Benthic Resources (3.4)	NMFS
5.	Construction, Operations, Decommissioning	Plankton surveys	The applicant will conduct plankton surveys per the proposed Project's final fisheries monitoring plan to estimate the relative abundance and distribution of planktonic species such as larval lobster using a towed neuston net to allow for comparison of baseline and post-construction results. Plankton tows will be conducted at 30 survey locations concurrently with the ventless trap surveys (i.e., two times per month from May through December). 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 the following components: • Within the first year of operations, the applicant will install automated radio telemetry receiving stations (Motus) and acoustic monitoring devices to estimate the exposure of threatened and endangered species and other migratory birds to the operating wind facility. • The applicant will perform acoustic monitoring of nocturnal songbirds at ESPs for up to 3 years post-construction. • The applicant will contribute $125,000 per year for 20 years for a tagging program for ESA and non-ESA listed species to either a regional monitoring fund (e.g., the Regional Wildlife Science Collaborative) or directly to a 3rd party (e.g., academic institution or consultancy), with species and type of tags to be selected based on research priorities at the time. • The applicant will install ~12 Motus receiver stations on turbines and deploy two Motus receiver stations onshore, to be re-evaluated every 5 years offshore and 3 years onshore. • The applicant will provide quarterly monitoring progress reports during the first year of post-construction avian and bat monitoring and comprehensive annual reports, followed by a discussion of each year's results with BOEM, BSEE, and USFWS, 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 or 3rd party websites. The applicant will propose data sharing methods in annual monitoring reports and discuss with BOEM, BSEE, and USFWS during annual monitoring meetings.	Birds (G.2.4)	BOEM 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 or in the ocean 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 (at newengland@fws.gov). 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 5 to 10 business days after the sighting. If practicable, carefully collect the dead specimen and preserve the material in the best possible state.	Birds (G.2.4)	BOEM BSEE
8.	Operations	Bird deterrent devices	The applicant will install bird deterrent devices on WTGs and ESPs to minimize bird attraction. 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 as part of the as-built documentation it must submit with the facility design report for the proposed Project. Observed use of WTGs and ESPs by birds will be documented in quarterly and annual reports and the need for supplemental deterrents discussed as part of annual meetings with BOEM, BSEE, and USFWS.	Birds (G.2.4)	USFWS 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. 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 USCG

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
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 to avoid/minimize impacts on benthic habitat to the maximum extent practicable. The applicant will avoid perpendicular crossings of sand wave features where feasible and safe. 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 applicant will require nearshore cable-laying activities to avoid high concentrations of fishing activities and natural resource events (spawning and egg laying), and comply with conditions imposed by MassDEP for activities in state waters.	Coastal Habitats and Fauna (3.5)	MassDEP 401 Water Quality Certification NMFS EFH
11.	Construction, Operations, Decommissioning	Anchoring plan	The applicant will implement an anchoring plan for all areas where anchoring is being used to avoid and minimize construction impacts on sensitive habitats to the maximum extent practicable, including hard-bottom and structurally complex habitats. 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 BSEE
12.	Construction	Benthic monitoring plan	The applicant will be required to consult with NMFS and the MassDEP and the Massachusetts Division of Marine Fisheries and address 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. The applicant will provide reporting per the proposed Project's final benthic monitoring plan.	Coastal Habitats and Fauna (3.5)	MassDEP 401 Water Quality Certification BOEM BSEE Nantucket Conservation Commission
13.	Construction	Benthic impact monitoring	To monitor potential benthic impacts, post-construction acoustic surveys (e.g., multibeam backscatter and side scan sonar) capable of detecting bathymetry changes of 0.5 meter (1.6 feet) or less should be completed to demonstrate how the bottom was modified by preparation and construction activities. In addition, locations of relocated boulders, created berms, and scour protection, including cable protection measures (i.e., concrete mattresses) should be provided to regulatory agencies. This information will not only inform impacts on benthic habitat but also help inform all interested parties of potential gear obstructions.	Benthic Resources (3.4); Coastal Habitats and Fauna (3.5)	BOEM BSEE NMFS USACE
14.	Construction	Scour protection and cable protection plans	The lessee will be required to develop and implement scour protection and cable protection plans to facilitate the avoidance and minimization of impacts on sensitive benthic habitats.	Benthic Resources (3.4); Coastal Habitats and Fauna (3.5)	BOEM BSEE NMFS USACE
15.	Construction	Potential gear obstructions	Locations of relocated boulders, created berms, and scour protection, including cable protection measures (i.e., concrete mattresses), should be provided to NOAA Fisheries, all other federal agencies with maritime jurisdiction, and the public as soon as possible to help inform all interested parties of potential gear obstructions.	Benthic Resources (3.4); Coastal Habitats and Fauna (3.5)	BOEM BSEE NMFS USACE
16.	Construction, Operation	Anti-corrosion protections	Any anti-corrosion protection methods or systems proposed should be identified. If sacrificial anodes are used, Al anodes should be selected over Zn anodes for external surfaces.	Water Quality (G.2.2); Benthic Resources (3.4)	BOEM BSEE NMFS
17.	Construction	Final cable protection in hard bottom	Where cable protection is required, the applicant will make every reasonable effort to use rock placement or a gabion system, as appropriate, to mimic native surficial material and reduce the use of concrete mats for permanent cable protection. Where concrete mattresses are used, the applicant will use environmentally friendly mattresses. Cable protection measures 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). 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.	Coastal Habitats and Fauna (3.5)	Massachusetts CZM BOEM BSEE
18.	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 BSEE

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19.	Construction	Dredge disposal sites	Where a TSHD is used, it is anticipated that the trailing suction hopper dredge will dredge along the cable alignment until the hopper is filled to an appropriate capacity, then it will navigate several hundred meters away and deposit the dredged material within an area of the surveyed corridor that also contains sand waves. Sand wave areas are identified in the COP (Figure 3.3-3 and Figure 4.3-3; Epsilon 2023). In addition, the applicant will report the locations of dredge disposal sites within state waters (high tide line to 3 nautical miles (3.5 miles) from shore) to BOEM, USACE, 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. If use of a TSHD is required during export cable installation, the applicant may be required to obtain a Marine Protection, Research, and Sanctuaries Act Section 103 permit from USACE to identify specific dumping locations for dredge material and the potential impacts of disposing dredge material in those locations. Under Section 103 of Marine Protection, Research, and Sanctuaries Act, USACE regulates the transportation of dredged material for purposes of dumping it into ocean water. At this time, the potential for use of a TSHD is low, and the applicant is not currently pursuing a Section 103 permit. Should the applicant determine the definitive need for the use of a TSHD during export cable installation, the applicant will coordinate with USACE regarding Section 103 permitting and supplemental National Environmental Policy Act review, as applicable, prior to conducting dredging activities as part of export cable installation. Considering the area affected in relation to the expanse of surrounding sand wave habitat, impacts would likely be minor.	Coastal Habitats and Fauna (3.5)	USACE MassDEP Massachusetts CZM
20.	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). 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 operations]) 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 BSEE NMFS
21.	Construction, Operations, Decommissioning	Long-term PAM	Highly migratory species like baleen whales occupy different parts of the Atlantic OCS at different times of the year. PAM is an effective tool to monitor baleen whale habitat use because it can detect the presence of whales when other methods are not feasible, such as periods of low visibility, poor weather, or when animals are far below the ocean's surface. The applicant must conduct long-term PAM to record ambient noise and marine species vocalizations in the lease area. Analysis of PAM data collected within the lease area allows for comparisons with acoustic data gathered during pre-construction periods, both in terms of the soniferous species that are present, as well as any changes to ambient noise due to the operation of the wind farm, which could affect species' distributions and/or behaviors. In addition, data collected within a lease area can be compared to data collected throughout the broader region, thus supporting cumulative effects analysis for highly migratory species.	Marine Mammals (3.7)	BOEM BSEE NMFS
22.	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 180 days prior to the commencement of pile-driving activities. The plan must: • Contain information on the visual and PAM components of the monitoring plan; • 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; • 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 • Include measures for enhanced monitoring capabilities in the event that poor visibility conditions unexpectedly arise, and pile driving cannot be stopped. 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. Additionally, all PSO and Native American monitors must complete a commercial PSO training program. 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 National Historic Preservation Act BSEE
23.	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: • The animal is verified to have voluntarily left and heading away from the exclusion area; or • 30 minutes have elapsed without re-detection (for mysticetes, sperm whales [*Physeter macrocephalus*], Risso's dolphins [*Grampus griseus*], and pilot whales); or • 15 minutes have elapsed without re-detection of other marine mammals.	Marine Mammals (3.7)	BOEM NOAA BSEE
24.	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: • 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); • Confirmation that all NARW(s) have left the 6.21-mile exclusion zone (November 1 to December 31); or • 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 NOAA BSEE

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25.	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: • 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. • 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). • 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. • 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. For all pile-driving activity, the applicant must designate clearance zones with radial distances as follows: • All other mysticete whales (including humpback [*Megaptera novaeangliae*], fin [*Balaenoptera physalus*], sei [*Balaenoptera borealis*], minke [*Balaenoptera acutorostrata*] whale, and sperm [*Physeter macrocephalus*] whale): 1,649-foot (500-meter) exclusion zone at all times; • Harbor porpoise [*Phocoena phocoena*]: 394-foot (120-meter) exclusion zone at all times; and • All other marine mammals not listed above (including dolphin and pinnipeds): 164-foot (50-meter) exclusion zone at all times. 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 NMFS NOAA BSEE
26.	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 180 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 (12 kilometers) of the pile-driving location, the PAM operator must determine that a NARW has been detected. 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. At all times of year that pile driving takes place, any PAM detection of a NARW within the clearance/exclusion zone surrounding a pile must be treated the same as a visual observation and trigger any required delays in pile installation. 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: 16,404 feet [5 kilometers] with impact only and 91,864 feet [28 kilometers] for impact with vibratory; jacket foundation: 16,404 feet [5 kilometers] with impact only and 95,144 feet [29 kilometers] for impact and vibratory]) 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 NMFS NOAA BSEE
27.	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: • The animal is verified to have voluntarily left and heading away from the exclusion area; or • 30 minutes have elapsed without re-detection (for mysticetes, sperm whales, Risso's dolphins, and pilot whales); or • 15 minutes have elapsed without re-detection of other marine mammals; or • Enhanced time-of-year NARW protocols are followed. 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 NMFS NOAA BSEE

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28.	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). PSOs, Native American monitors, 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. PSOs, Native American monitors, 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. 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. PSOs on duty must be clearly listed on daily data logs for each shift. A sufficient number of PSOs, which will be consistent with the NMFS BO and as prescribed in the final LOA, 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. PSOs and PAM operators must not exceed 4 consecutive watch hours on duty at any time, must have a 2-hour (minimum) break between watches, and must not exceed a combined watch schedule of more than 12 hours in a 24-hour period. If the schedule includes PSOs and PAM operators on-duty for 2-hour shifts, a minimum 1-hour break between watches must be allowed. 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. 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. Observations must be conducted while free from distractions and in a consistent, systematic, and diligent manner.	Marine Mammals (3.7)	BOEM NOAA BSEE
29.	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 speeds less than 10 knots when mother/calf pairs, pods, or large assemblages of cetaceans are observed within the path of the vessel. All vessels must also abide by existing applicable vessel speed regulations. **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 (500 meters) of vessel within this area. The vessel captain must immediately implement strike-avoidance procedures to maintain a separation distance of 1,640 feet (500 meters) 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 (200 meters) 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. **Small cetaceans and seals**: For small cetaceans and seals, all vessels must maintain a minimum separation distance of 164 feet (50 meters) 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 NMFS BSEE
30.	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. 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 BSEE
31.	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 speeds less than 10 knots when transiting to, from, or within the SWDA, except within Nantucket Sound (unless an active DMA is in place).	Marine Mammals (3.7)	BOEM NOAA BSEE

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32.	Construction, Operations, Decommissioning	Vessel speed requirements in DMAs	All vessels, regardless of length, must travel at speeds less than 10 knots within any NMFS-designated DMA	Marine Mammals (3.7)	NOAA BSEE
33.	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 NOAA BSEE
34.	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 BO and LOA 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 BSEE
35.	Construction	Pile-driving SFV 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 USACE and BOEM at renewablereporting@boem.gov, and to NMFS at PR.ITP.MonitoringReports@noaa.gov and nmfs.gar.incidental-take@noaa.gov for review and approval 180 days prior to the commencement of field activities for pile driving. Sound field verification must be carried out for the first three monopile foundations and the first two jacket foundations to be installed, including vibratory and impact pile driving. Subsequent SFV is required should additional piles be driven that are anticipated to produce louder sound fields than those previously measured. 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 stage, as every pile is capable of producing impact. At minimum, SFV must be performed at: • Two installations at representative depths (one shallower, one deeper) of each pile size and each foundation type installed; • One foundation installed each in November and December if any are installed in those months; • One foundation in each calendar year of installation; and • The installation of the largest hammer used in each of the above situations. 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 BSEE
36.	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. 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. 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 180 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. A Reduced Visibility Monitoring Plan/Nighttime Pile Driving Monitoring Plan would also be prepared and submitted to outline how piledriving during periods of reduced visibility or during nighttime would occur.	Marine Mammals (3.7); Sea Turtles (3.8)	NMFS BSEE
37.	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). 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 BSEE

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
38.	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 PR.ITP.MonitoringReports@noaa.gov and nmfs.gar.incidental-take@noaa.govand 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. 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. **Reporting Instructions** 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: • The applicant must require PSO providers to submit PSO data in Excel format every 7 days. • Data must be collected in accordance with standard reporting forms, software tools, or electronic data forms approved by BOEM for the particular activity. • Forms must be filled out for each vessel with PSOs aboard. • Do not use NA for unfilled cells; leave them empty. • Submit report in Word and Excel formats (do not submit a pdf). • All dates must be entered as YYYY-MM-DD. • All times must be entered in 24 Hour UTC as HH:MM. • 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. • 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 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. **Project Information for Pile Driving** • Project name • Lease number • State coastal zones • PSO contractor(s) • Vessel name(s) • Reporting dates • Sound sources including hammer type(s) and power levels used • Visual monitoring equipment used (e.g., bionics, magnification, infrared cameras, etc.) • Distance-finding method used • PSO names and training • Observation height above sea surface **Operations Information for Pile Driving** • Date • Hammer type (make and model) • Greatest hammer power used for each pile • Pile identifier and pile number for the day (e.g., pile two of three for the day) • Pile diameters • Pile length • Pile locations (latitude and longitude) • Time pre-exclusion visual monitoring began in UTC (HH:MM) • Time pre-exclusion monitoring ended in UTC (HH:MM) • Time pre-exclusion PAM monitoring began in UTC (HH:MM) • Time PAM monitoring ended in UTC (HH:MM) • Duration of pre-exclusion and PAM visual monitoring • Time power up/ramp up began • Time equipment full power was reached	Marine Mammals (3.7); Sea Turtles (3.8)	NMFS NOAA BSEE

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			• Duration of power up/ramp up • Time pile driving began (hammer on) • Time pile-driving activity ended (hammer off) • Duration of activity • Shutdown/power-down occur (Y/N) • Time shutdown was called for (UTC) • Time equipment was shut down (UTC) • Record any habitat or prey observations • Record any marine debris sighted **Detection Information for Protected Species** • Date (YYYY-MM-DD) • Sighting ID (V01, V02, or sequential sighting number for that day) (multiple sightings of same animal or group should use the same ID) • Date and time at first detection in UTC (YY-MM-DDT HH:MM) • Time at last detection in UTC (YY-MM-DDT HH:MM) • PSO name(s) (Last, First) • Effort (ON=source on; OFF =source off) • Latitude (decimal degrees dd.ddddd), longitude (decimal degrees dd.ddddd) • Compass heading of vessel (degrees) • Water depth (meters) • Swell height (meters) • Douglas sea scale • Precipitation • Visibility (kilometers) • Cloud coverage (%) • Glare • Sightings including common name, scientific name, or family • Certainty of identification • Number of adults • Number of juveniles • Total number of animals • Bearing to animal(s) when first detected (ship heading + clock face) • Range from vessel (reticle distance in meters) • 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.) • Detection narrative (note behavior, especially changes in relation to survey activity and distance from source vessel) • Direction of travel/first approach (relative to vessel) • Behaviors observed: indicate behaviors and behavioral changes observed in sequential order (use behavioral codes) • If any bow-riding behavior observed, record total duration during detection (HH:MM) • Initial heading of animal(s) (degrees) • Final heading of animal(s) (degrees) • Source activity at initial detection • Source activity at final detection (on or off) • Exclusion zone size during detection (meters) • Animal inside or outside the exclusion zone • Closest distance to vessel (reticle distance in meters) • Time at closest approach (UTC HH:MM) • Time animal entered exclusion zone (UTC HH:MM) • Time animal left exclusion zone (UTC HH:MM) • 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 • Shut-down or power-down occurrences • Detections with PAM **Monitoring Effort Information for Pile Driving** • Date • Effort (ON=source on; OFF=source off)		

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			• If visual, number of PSOs on watch at one time • PSO name(s) (Last, First) • Start time of observations • End time of observations • Duration of visual observation • Wind speed (knots), from direction • Swell (meters) • Water depth (meters) • Visibility (kilometers) • Glare severity • Block name and number • Location: Latitude and Longitude		
39.	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. 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. **Project Information for Surveys** • Project name • Lease number • State coastal zones • Survey contractor • Vessel name • Survey type (typically HRG) • Reporting start and end dates • Sound sources including equipment type, power level, and frequencies used • Greatest root mean squared source level • Visual monitoring equipment used (e.g., bionics, magnification, infrared cameras, etc.) • Distance-finding method used • PSO names and training • Observation height above sea surface **Operations Information for Surveys** • Date • Time pre-exclusion visual monitoring began in UTC (HH:MM) • Time pre-exclusion monitoring ended in UTC (HH:MM) • Duration of pre-exclusion visual monitoring • Day or night pre-exclusion • Time power up/ramp up began • Time equipment full power was reached • Duration of power up/ramp up • Time survey activity began (equipment on) • Time survey activity ended (equipment off) • Duration of activity • Shutdown/power-down occur (Y/N) • Time shutdown was called for (UTC) • Time equipment was shut down (UTC) • Vessel positions must be logged every 30 seconds • Record any habitat or prey observations	Marine Mammals (3.7); Sea Turtles (3.8)	BOEM BSEE

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			• Record any marine debris sighted **<u>Detection Information for Protected Species</u>** • Date (YYYY-MM-DD) • Sighting ID (V01, V02, or sequential sighting number for that day; multiple sightings of same animal or group should use the same ID) • Date and time at first detection in UTC (YY-MM-DDT HH:MM) • Time at last detection in UTC (YY-MM-DDT HH:MM) • PSO name(s) (Last, First) • Effort (ON=source on; OFF =source off) • Latitude (decimal degrees dd.ddddd), Longitude (decimal degrees dd.ddddd) • Compass heading of vessel (degrees) • Water depth (meters) • Swell height (meters) • Douglas sea scale • Precipitation • Visibility (kilometers) Cloud coverage (%) • Glare • Sightings including common name, scientific name, or Family • Certainty of identification • Number of adults • Number of juveniles • Total number of animals • Bearing to animal(s) when first detected (ship heading + clock face) • Range from vessel (reticle distance in meters) • 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.) • Detection narrative (note behavior, especially changes in relation to survey activity and distance from source vessel) • Direction of travel/first approach (relative to vessel) • Behaviors observed: indicate behaviors and behavioral changes observed in sequential order • If any bow-riding behavior observed, record total duration during detection (HH:MM) • Initial heading of animal(s) (degrees) • Final heading of animal(s) (degrees) • Source activity at initial detection • Source activity at final detection (on or off) • Exclusion zone size during detection (meters) • Animal inside or outside the exclusion zone • Closest distance to vessel (reticle distance in meters) • Time at closest approach (UTC HH:MM) • Time animal entered exclusion zone (UTC HH:MM) • Time animal left exclusion zone (UTC HH:MM) • 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 • Shutdown or power-down • Detected with infrared (Y/N) **<u>Monitoring Effort Information for Surveys</u>** • Date • Effort (ON=source on; OFF=source off) • If visual, number of PSOs on watch at one time • PSO name(s) (Last, First) • Start time of observations • End time of observations • Duration of visual observation • Wind speed (knots), from direction • Swell (meters) • Water depth (meters) • 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]
			• Glare severity • Block name and number • Location: Latitude and Longitude		
40.	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 and NMFS 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 NOAA BOEM BSEE
41.	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
42.	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 BSEE
43.	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 and as defined in NMFS's BO and the final LOA (once issued). 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. **<u>Detection Information for Protected Species</u>** • Date (YYYY-MM-DD) • Sighting ID (V01, V02, or sequential sighting number for that day) (multiple sightings of same animal or group should use the same ID) • Date and time at first detection in UTC (YY-MM-DDT HH:MM) • Time at last detection in UTC (YY-MM-DDT HH:MM) • PSO name(s) (Last, First) • Effort (ON=source on; OFF=source off) • Latitude (decimal degrees dd.ddddd), Longitude (decimal degrees dd.ddddd) • Compass heading of vessel (degrees) • Water depth (meters) • Swell height (meters) • Douglas sea scale • Beaufort scale • Precipitation • Visibility (kilometers) • Cloud coverage (%) • Glare • Sightings including common name, scientific name, or family • Certainty of identification • Number of adults • Number of juveniles • Total number of animals • Bearing to animal(s) when first detected (ship heading + clock face) • Range from vessel (reticle distance in meters) • 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.) • Detection narrative (note behavior, especially changes in relation to survey activity and distance from source vessel) • Direction of travel/first approach (relative to vessel) • Behaviors observed: indicate behaviors and behavioral changes observed in sequential order (use behavioral codes) • If any bow-riding behavior observed, record total duration during detection (HH:MM) • Initial heading of animal(s) (degrees)	Marine Mammals (3.7); Sea Turtles (3.8)	BOEM NMFS NOAA BSEE

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			• Final heading of animal(s) (degrees) • Source activity at initial detection • Source activity at final detection (on or off) • Exclusion zone size during detection (meters) • Animal inside or outside the exclusion zone • Closest distance to vessel (reticle distance in meters) • Time at closest approach (UTC HH:MM) • Time animal entered exclusion zone (UTC HH:MM) • Time animal left exclusion zone (UTC HH:MM) • 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 • Shut-down or power-down occurrences • Detections with PAM **Monitoring Effort Information for Pile Driving** • Date • Effort (ON=source on; OFF=source off) • If visual, number of PSOs on watch at one time • PSO name(s) (Last, First) • Start time of observations • End time of observations • Duration of visual observation • Wind speed (knots), from direction • Beaufort scale • Swell (meters) • Douglas sea scale • Water depth (meters) • Visibility (kilometers) • Glare severity • Block name and number • Location: latitude and longitude		
44.	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, PR.ITP.MonitoringReports@noaa.gov and nmfs.gar.incidental-take@noaa.gov; NOAA Fisheries 24-hour Stranding Hotline number (866-755-6622); and BOEM at renewable_reporting@boem.gov. 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, PR.ITP.MonitoringReports@noaa.gov and nmfs.gar.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. 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). 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 NOAA BSEE
45.	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	Marine Mammals (3.7); Sea Turtles (3.8)	NMFS NOAA BSEE

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			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.		
46.	Construction, Operations, Decommissioning	Vessel speed requirements in SMAs	All vessels regardless of size must comply with the 10-knot speed restriction in any SMA (NOAA 2022).	Marine Mammals (3.7); Sea Turtles (3.8)	NOAA
47.	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 any marine mammal or sea turtle to a PSO or vessel captains associated with other proposed Project vessels. Furthermore, any marine mammal observed by project personnel must be immediately communicated to any on-duty PSOs, PAM operator(s), and all vessel captains. Any large whale observation or acoustic detection by PSOs or PAM operators must be conveyed to all vessel captains.	Marine Mammals (3.7); Sea Turtles (3.8)	BOEM BSEE
48.	Construction, Operations	Visual monitoring during UXO detonations (vessel-based)	The applicant will comply with a modified visual monitoring measure for UXO detonations: • At least four PSOs must be actively observing marine mammals before and after any UXO/MEC detonation. At least two PSOs must be stationed and observing on a vessel as close as possible to the detonation site and at least two PSOs must be stationed on a secondary, PSO-dedicated vessel or aerial platform. Concurrently, at least one acoustic monitoring PSO (i.e., PAM operator) must be actively monitoring for marine mammals with PAM before, during, and after detonation.	Marine Mammals (3.7); Sea Turtles (3.8)	NMFS NOAA BOEM BSEE
49.	Construction, Operations	PAM during UXO detonations	BOEM will require that the applicant comply with applicant-proposed measures for UXO detonations, and the dedicated PAM PSO must acoustically monitor to a minimum radius of 8.8 miles (14.1 kilometers) around the detonation site.	Marine Mammals (3.7); Sea Turtles (3.8)	NMFS NOAA BOEM BSEE
50.	Construction, Operations	UXO Clearance zones	BOEM will require the applicant comply with applicant-proposed measures, and BOEM will require that a 5,249-foot (1,600-meter) sea turtle clearance zone be established.	Marine Mammals (3.7); Sea Turtles (3.8)	NMFS NOAA BOEM BSEE
51.	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 (100 meters) 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 BSEE
52.	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 BSEE
53.	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 (500 meters) or less from a survey vessel. PSOs must notify the vessel captain of any whale within 1,640 feet (500 meters) of vessel within this area. The vessel captain must immediately implement strike-avoidance procedures to maintain a separation distance of 1,640 feet (500 meters) from listed whales including changing vessel direction or reducing vessel speed to allow the animal to travel away from the vessel. Any time a listed species (sea turtles, whales, and manta rays) is within a 656-foot (200 meters) 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 BSEE

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
54.	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. 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 BSEE
55.	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 (200 meters) 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 BSEE
56.	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: • Confirm that the full extent of the harassment distances (175 dB root mean squared) from piles are monitored for sea turtles to ensure that all potential take is documented; • Include (1,640 feet (500 meters)) exclusion zones and exclusion zone modification protocols and approvals required; • 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 • Include measures for enhanced monitoring capabilities if poor visibility conditions unexpectedly arise, and pile driving cannot be stopped. 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 NOAA BSEE
57.	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 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 USACE as soon as they are available; NMFS, BOEM, and 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 BSEE
58.	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 BSEE
59.	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 (100 meters) 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 (100 meters) 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 (50 meters) 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 (100 meters) at which time normal vessel operations may be resumed. Between June 1 and	Sea Turtles (3.8)	NMFS BSEE

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			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.		
60.	Construction, Operations, Decommissioning	Geophysical survey exclusion zone, power-up, and restart procedures	The applicant will apply the following limitations and conditions to geophysical surveys: • 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. • At full power, a shutdown of sparker equipment must occur any time a sea turtle is sighted within 164 feet (50 meters) of the vessel. Following a shutdown for any reason or when sea turtles are sighted within 164 feet (50 meters) 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 BSEE
61.	Operations	Post-installation cable monitoring	The applicant must provide BOEM and NOAA with a cable monitoring report within 90 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. 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 or equivalent 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. In addition to inspection, the export cable will be monitored continuously with the as-built DTS or equivalent system. If data indicate that burial conditions have deteriorated or changed significantly and remedial actions are warranted a seabed stability analysis, and report of remedial actions taken or scheduled must be provided to BOEM within 45 calendar days of the observations. The DTS or equivalent 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 BSEE
62.	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): • A gear loss and damage compensation program to address the impact-producing factor for presence of structures during construction, operations, and decommissioning by reducing impacts resulting from loss of gear associated with uncharted obstructions resulting from the proposed Project. • 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. ○ The applicant shall establish a compensation/mitigation fund (Fund) consistent with BOEM's draft Guidance for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR 585 (Guidance) to compensate commercial and for-hire recreational fishermen for loss of income due to unrecovered economic activity resulting from displacement from fishing grounds due to project construction and operations and to shoreside businesses for losses indirectly related to the Project. For losses to commercial and for-hire recreational fishermen, the Fund shall be based on the revenue exposure for fisheries based out of ports listed in Table 3.9-6: Average Annual Revenue from the Southern Wind Development Area for Most Impacted Ports, 2008–2021. For losses to shoreside businesses, the applicant shall analyze the impacts to shoreside seafood businesses adjacent to ports listed in Table 3.9-6.	Commercial Fisheries and For-Hire Recreational Fishing (3.9)	BOEM BSEE
63.	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, including rock placement or a gabion system.	Commercial Fisheries and For-Hire Recreational Fishing (3.9)	BOEM BSEE
64.	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
65.	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 50 tows, 25 in the proposed Project area and 25 in control areas, will be conducted seasonally during spring (April through June), summer (July through September), fall (October through December) and winter (January through March) (four times per year). 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 BSEE
66.	Construction, Operations	Ventless trap surveys	The applicant will conduct a stratified random ventless lobster trap survey to sample American lobster (*Homarus americanus*), Jonah crab (*Cancer borealis*), and black sea bass (*Centropristis striata*) in the lease area and control area during May through December. Thirty strings split between the control and development areas will be deployed, with six traps per string alternating vented and ventless. A single fish pot will be added to each string of lobster traps to collect general information on black sea bass, as well as their predation rates on lobsters. A mark-recapture tagging study and neuston sampling will also occur in coordination with the ventless trap sampling. There will be 15 sampling sites in	Commercial Fisheries and For-Hire	NMFS BSEE

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			the study area and 15 in the control area, for a total of 30 stations. Each location will be sampled two times per month. To the degree possible, survey gear will be hauled on a 3-day soak time, in the attempt to standardize catchability among trips. To avoid entanglement with vertical lines, buoy lines will be weighted and will not float at the surface of the water, and all groundlines will consist of sinking line. Buoy lines and linkages will be compliant with best practices. Ropeless gear may be tested and used. All buoys will be properly labeled with the scientific permit number and identification as research gear.	Recreational Fishing (3.9); Other Uses (3.14)	
67.	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 BSEE
68.	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: • 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. • 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. • 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. • 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 BSEE
69.	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 BSEE
70.	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 BSEE
71.	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 BSEE
72.	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 BSEE
73.	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 BSEE

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74.	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 BSEE
75.	Construction	Boulder relocation reporting	The applicant will report the locations of any boulders (which protrude 6.5 feet [2 meters] or more above the sea floor) relocated during cable installation activities to BOEM, MassDEP, Massachusetts CZM, Rhode Island Coastal Resources Management Council, the USCG, NOAA, and the local harbormaster (if within a town's jurisdiction) 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 BSEE
76.	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
77.	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: • Provide BOEM, BSEE, 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. • Mark each individual WTG and ESP with clearly visible, unique, alphanumeric identification characters. • Light each WTG and ESP in a manner that is visible by mariners in a 360-degree arc around the WTG and ESP. • 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. • Ensure each WTG is lighted with red obstruction lighting consistent with the Federal Aviation Administration 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. • 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. • 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. • 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 BSEE
78.	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
79.	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 BSEE approval.	Navigation and Vessel Traffic (3.13)	USCG BSEE
80.	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, BSEE, 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 and BSEE: • Standard Operating Procedures: This includes methods for establishing and testing WTG rotor shutdown; methods of lighting control; method(s) for notifying the USCG and BSEE of mariners in distress or potential/actual SAR incidents; method(s) for notifying the USCG and BSEE of any events or incidents that may impact maritime safety or security; and methods for providing the USCG and BSEE with environmental data, imagery, communications and other information pertinent to SAR or marine pollution response. • 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. • Communications: These are the capabilities to be maintained by the control center(s) to communicate with the USCG, BSEE, and mariners within and in the vicinity of the proposed Project area. Communications capability will at a minimum include VHF marine radio and landline and wireless for voice and data. • 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
81.	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, BSEE, 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 BSEE

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82.	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. **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. **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
83.	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
84.	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 BSEE
85.	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 BSEE
86.	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: • Acknowledge that structures can withstand the daily sonic overpressures (sonic booms) and potential falling debris from dispensing chaff and flare; • Confirm that the U.S. Air Force will not be held liable for any damage to property or personnel (Hold and Save Harmless clause); • Notify North American Aerospace Defense Command 30 to 60 days prior to proposed Project completion for radar adverse impact management scheduling; • Contribute $80,000 for radar adverse impact management execution; • Curtail of operations for national security or defense purposes as described in the leasing agreement; and • 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
87.	Construction, Operations, Decommissioning	Mitigation for oceanographic high-frequency radars	To mitigate operational impacts on oceanographic high-frequency radars, the applicant will develop a plan with the NOAA Integrated Ocean Observing System Surface Currents Program for data sharing from turbine operators to include (a) sharing real-time telemetry of surface currents, waves, and other oceanographic data measured at locations in the proposed Project into the public domain; and (b) if needed by the Integrated Ocean Observing System Surface Currents Program to enhance mitigation, additional sharing of time-series of WTG blade rotation rates, nacelle bearing angles, and other information about the operational state of each of the proposed Project's turbines with high-frequency radar operators to aid interference mitigation.	Other Uses (3.14)	NOAA BOEM BSEE
88.	Construction, Operations, Decommissioning	Scientific survey mitigation	The applicant will fund and implement a mitigation program to address impacts from the proposed Project and potential cumulative impacts on recurring scientific surveys, including: • **Evaluation of survey designs**: Evaluate and quantify impacts of proposed Project-related wind development activities and potential cumulative impacts on scientific survey operations and on provision of scientific advice to management. • **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. • **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. • **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. • **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. • **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
89.	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

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
90.	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. In addition, the applicant will submit a lighting plan specific to the proposed Phase 1 Substation on Shootflying Hill Road to ensure that lighting is shielded and directed to eliminate glare and spillover onto adjacent properties.	Scenic and Visual Resources (3.16); Land Use and Coastal Infrastructure (G.2.7)	BOEM BSEE
91.	Construction, Operations, Decommissioning	BSEE As-built reports	The applicant will submit the following reports to BSEE (via TIMSWeb): • 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; • 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; • As-built report of cable protection measures; • Trip reports for bi-annual optical survey work to confirm compliance; • Tri-annual scour protection reports, starting in Year 3, along with reports documenting any subsequent repair/modification of scour protection; • Trip reports for (May through October) bi-monthly plankton survey work; • Copies of pre-construction, construction, and post-construction fisheries surveys; • Copies of benthic monitoring reports (Measure 11) and reports on the analysis of benthic grabs and video transects; • Trawl survey reports; • Ventless trap survey reports; • Boulder relocation reporting; • Pile driving reports; and • Interim (monthly) and final PSO reporting.	Multiple	BSEE
92.	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 5 to 10 business days 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 BSEE USFWS
93.	Construction, Operations, Decommissioning	Dark sky lighting	Where safe and feasible, implement the National Park Service's Sustainable Outdoor Lighting Specifications (NPS 2022), including: • Use light-emitting diode fixtures that have a warm color hue (i.e., 2,700 Kelvin); • Use recessed and fully shielded (or "full cut off") light fixtures; • Do not use upward-facing lights; • Use fixtures that include or can accommodate timers, motion detectors, hue adapters, and dimmers; and • 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 BSEE
94.	Operations	Structure micro-siting	The applicant must not adjust approved structure locations in a way that narrows any northwest-to-southeast or northeast-to-southwest transit corridors to less than 0.6 nautical mile (0.7 mile). The applicant must not co-locate ESPs at approved structure locations by adding more than one foundation at an approved location.	Navigation and Vessel Traffic (3.13)	BOEM BSEE USCG
95.	Construction, Operation	Western Muskeget Variant Contingency Option	Use of the Western Muskeget Variant Contingency Option (i.e., Alternative B, Scenario 2) would require a written justification from the applicant to BOEM that use of the Western Muskeget Variant is necessary to preserve Project viability. BOEM would evaluate the need for exercising the contingency option to preserve project viability prior to granting any approvals to exercise the option.	Benthic Resources (3.4); Finfish, Invertebrates, and Essential Fish Habitat (3.6); Marine Mammals (3.7); Sea Turtles (3.8); Commercial and Recreational For-Hire Fisheries (3.9); Cultural Resources (3.10)	BOEM BSEE NMFS
96.	Construction, Operations, Decommissioning	Avian and bat monitoring program	At least 45 calendar days before beginning surveys, the applicant must complete, obtain concurrence from BOEM, BSEE, and USFWS, and adopt an avian and bat monitoring plan, including coordination with interested stakeholders. BOEM, BSEE, and USFWS 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 applicable agency's satisfaction before implementing the plan. The applicant may conclude that BOEM, BSEE, and/or USFWS have concurred in the avian and bat monitoring plan if no comments on the plan are provided within 30 calendar days of submittal:	Bats (G.2.3); Birds (G.2.4)	BOEM BSEE USFWS

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			• Monitoring. All monitoring provisions relative to listed species provided in the BO and the associated ITS must be implemented by the applicant. Where these measures conflict with the Final EIS, measures provided in the BO will supersede those provided in the Final EIS. Specific monitoring components were identified as part of consultation with USFWS and will include: ○ Annual monitoring reports. The applicant must submit to BOEM (at renewable_reporting@boem.gov), USFWS (at newengland@fws.gov), and BSEE (TIMSWeb with a notification email to protectedspecies@bsee.gov) a comprehensive report after each full year of monitoring (pre- and post-construction) within 6 months of completion of the last monitoring activity. The report must include all data, analyses, and summaries regarding ESA-listed and non-ESA-listed birds and bats. BOEM, BSEE, and USFWS 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. Following an adaptive management approach, revisions to the avian and bat monitoring plan will be discussed with BOEM, BSEE, and USFWS during review meetings of the annual monitoring plans. ○ 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), USFWS (at newengland@fws.gov), and BSEE (TIMSWeb with a notification email to protectedspecies@bsee.gov) 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. ○ Monitoring plan revisions. Within 30 calendar days of submitting the annual monitoring report, the applicant must meet with BOEM, BSEE, 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 BOEM, BSEE, and/or USFWS determines after this discussion that revisions to the avian and bat monitoring plan are necessary, applicable agencies 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 BOEM, BSEE, and USFWS recommendations for new mitigation measures and/or monitoring methods. Additional monitoring and/or mitigation measures will not preclude BOEM and/or USFWS review of monitoring data to determine if reinitiation criteria are met. ○ Operational reporting (operations). The applicant must submit to BOEM (at renewable_reporting@boem.gov), USFWS (at newengland@fws.gov), and BSEE ((TIMSWeb with a notification email to protectedspecies@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. BOEM, BSEE, and USFWS 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. ○ 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 BOEM, BSEE, and USFWS upon request for the duration of the lease. The applicant must work with BOEM and BSEE 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.		
RMPs, Terms and Conditions, Monitoring and Reporting Requirements, and CRs from the USFWS BO Issued September 28, 2023					
RMPs and Terms and Conditions					
97.	Construction, Operations	Collision minimization report	Current technologies and methods will be periodically reviewed for minimizing collision risk of listed and migratory birds with WTGs, including, but not limited to, WTG coloration/marking, lighting, avian deterrents, remote sensing such as radar and thermal cameras, and limited WTG operational changes. • Prior to the start of the first WTG operations for the proposed Project, BOEM must compile, from existing proposed Project documentation (e.g., the biological assessment, other consultation documents, the Final EIS, the COP), a stand-alone summary of technologies and methods that BOEM evaluated to reduce or minimize bird collisions at the proposed Project WTGs. • Within 5 years of the start of the first WTG operation, and then every 5 years for the life of the proposed Project, BOEM must prepare a collision minimization report, reviewing best available scientific and commercial data on technologies and methods that have been implemented, or are being studied, to reduce or minimize bird collisions at offshore and onshore WTGs. The review must be global in scope. • BOEM must distribute a draft collision minimization report to the services, Park City Wind, and appropriate state agencies for a 60-day review period; BOEM must address all comments received during the review period and issue the final report within 60 days of the close of the review period. • Following issuance of the final collision minimization report, the services may call for a meeting. Within 60 days following a call for such a meeting, BOEM must convene a meeting with BSEE, the services, the applicant, and appropriate state agencies to discuss the collision minimization report and whether implementation of any technologies/methods is warranted.	Bats (G.2.3); Birds (G.2.4)	BOEM BSEE USFWS
Monitoring and Reporting Requirements for Incidental Take					
98.	Construction, Operations	Piping Plover and Rufa Red Knot monitoring	BOEM or the applicant will monitor the action area for Piping Plovers (*Charadrius melodus*) and Rufa Red Knots (*Calidris canutus rufa*). As effective technology and methods become available, BOEM should include monitoring for Piping Plovers and Rufa Red Knots that may have collided with a WTG during migration. The monitoring method(s) should be informed by the best available information and technology and could include boat-based monitoring, Motus stations, remote sensing, cameras, microphones, Doppler and Next Generation Weather Radar, environmental DNA, etc. The monitoring should occur during the time(s) of year when collisions are most likely. Initially, monitoring will proceed according to the applicant's Avian and Bat Post-Construction Monitoring Framework and be operational for the first Piping Plover and Rufa Red Knot migratory seasons after the WTGs are operational. Subsequently, consideration of new methods and timing will occur on the same timeline as the collision minimization report described in the Terms and Conditions above unless BOEM and the service agree to a different schedule.	Bats (G.2.3); Birds (G.2.4)	BOEM BSEE USFWS

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			BOEM will notify USFWS within 2 business days if an injured or dead Piping Plover or Rufa Red Knot is identified in or within 1 mile of the proposed Project lease area. BOEM or the applicant will provide a report to USFWS annually summarizing: • Monitoring efforts, methods, and results; • Observations of injured or dead Piping Plovers and Rufa Red Knots; • Observations of any listed species perching on the proposed Project infrastructure (including offshore substations); • Implementation and effectiveness of avoidance and minimization measures; and • Any other relevant activity and information related to the proposed action and potential impacts on listed species. BOEM will submit the report to USFWS by the end of each calendar year or at another time agreed to by the two agencies. This report can be part of a larger, more comprehensive offshore wind report submitted to USFWS annually. Reports and notifications will be submitted to: Field Supervisor New England Field Office U.S. Fish and Wildlife Service 70 Commercial Street, Suite 300 Concord, NH 03301 newengland@fws.gov 603-223-2541		
CRs					
99.	Operations	Offshore wind adaptive monitoring and impact minimization framework	To address USFWS concerns related to potential impacts of WTG operation on listed and other species of concern, at both the proposed Project and coastwide scales, USFWS recommends that BOEM develop and adopt an Offshore Wind Adaptive Monitoring and Impact Minimization Framework (Framework) for flying wildlife. Details will follow, but the following are some basic principles for establishment, adoption, and operation of the Framework: 1. Establish a Framework Principals Group to consist of representatives from BOEM, BSEE, USFWS, state natural resource agencies responsible for management of birds, bats, and insect, and offshore wind energy developers/operators. 2. Develop and adopt a written Framework foundational document specifying: a. The governance structure of the Principals Group; b. The geographic coverage of the Framework; c. The species covered by the Framework; and d. The duration of the Framework. 3. Establish an annual operating budget for the Framework to be funded by offshore wind energy developers/operators. 4. Arrange for the Principals Group to meet at least annually and for the Framework foundational document to be updated at least every 5 years. 5. Provide for experts (both internal and external to the Principals Group) to regularly assess new and improved technologies and methods for estimating collision risk of covered species and measuring or detecting collisions. Adopt and deploy such methods deemed most promising by the Principals Group. 6. Coordinate monitoring and research across wind energy projects. Share and pool data and research results coastwide. 7. Provide for experts (both internal and external to the Principals Group) to regularly assess new and improved technologies and methods for minimizing collision risk of covered species. Adopt and deploy such technologies/methods deemed most promising by the Principals Group. 8. Provide for experts (both internal and external to the Principals Group) to periodically assess new and improved technologies and methods for evaluating indirect impacts to covered species from WTG avoidance behaviors (e.g., impacts on time and energy budgets). 9. Periodically assess the level and type of compensatory mitigation necessary to offset any unavoidable direct and indirect impacts of WTG operation on covered species. Adopt and require the levels and types of mitigation deemed appropriate by the Principals Group. 10. Consider partnering with other stakeholders or cross-sector organizations to provide administrative, institutional, and technical support to the Principals Group.	Bats (G.2.3); Birds (G.2.4)	BOEM BSEE USFWS
100.	Operations	Coastwide buildout analysis	While USFWS will complete a thorough assessment of potential direct and indirect impacts for each individual future offshore wind project, USFWS recommends BOEM to analyze potential aggregate impacts from WTG operation at a coastwide scale. A coastwide analysis will work in concert with the Offshore Wind Adaptive Monitoring and Impact Minimization Framework to comprehensively assess, monitor, and manage avian impacts from wind energy development along the U.S. Atlantic coast. A programmatic consultation for wind energy development in the New York Bight is already underway and could set the stage for a full coastwide analysis. Ultimately, a coastwide programmatic opinion may emerge as the most effective and efficient mechanism for assessing, monitoring, minimizing, and offsetting impacts on listed birds from WTG operation on the OCS.	Bats (G.2.3); Birds (G.2.4)	BOEM BSEE USFWS

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
101.	Construction, Operations	Compensatory mitigation	To minimize population-level impacts on listed birds, BOEM will require the applicant to provide appropriate compensatory mitigation to offset projected levels of take of listed birds from WTG collision. Compensatory mitigation should be consistent with the conservation needs of listed species as identified in USFWS documents including, but not limited to, listing documents, species status assessments, recovery plans, recovery implementation strategies, and 5-year reviews. Compensatory mitigation should preferentially address priority actions, activities, or tasks identified in a recovery plan, recovery implementation strategies, or 5-year review for Piping Plovers and Rufa Red Knots; however, research, monitoring, outreach, and other recovery efforts that do not offset birds killed via collision mortality are not considered compensatory mitigation. Compensatory mitigation may include, but is not limited to: restoration or management of lands, waters, sediment, vegetation, or prey species to improve habitat quality or quantity for listed birds; efforts to facilitate habitat migration or otherwise adapt to sea level rise; predator management; management of human activities to reduce disturbance to listed birds; and efforts to curtail other sources of direct human-caused bird mortality such as from vehicles, collision with other structures (e.g., power lines, terrestrial wind turbines), hunting, oil spills, and harmful algal blooms. Geographic considerations may include, but are not limited to, any listed species recovery unit(s) or other management unit(s) determined to be disproportionally affected by or vulnerable to collision mortality; and/or those portions of a species' range where compensatory mitigation is most likely to be effective in offsetting collision mortality. Compensatory mitigation for the proposed Project may be combined with mitigation associated with other offshore wind projects, but in no case should compensatory mitigation be double-counted as applying to more than one offshore wind project. BOEM will require the applicant to prepare a compensatory mitigation plan prior to the commissioning of the first WTG. The compensatory mitigation plan should provide compensatory mitigation actions to offset projected levels of take of listed birds at a ratio of at least 1:1 for the full 33-year lease, although it may include actions to offset projected take at a higher ration. The compensatory mitigation plan should include: • Detailed description of one or more specific mitigation actions; • The specific location for each action; • A timeline for completion; • Itemized costs; • A list of necessary permits, approvals, and permissions; • Details of the mitigation mechanism (e.g., mitigation agreement, applicant-proposed mitigation); • Best available science linking the compensatory mitigation action(s) to the projected level of collision mortality as described in the opinion; • A schedule for completion; • Monitoring to ensure the effectiveness of the action(s) in offsetting the target level of take; • Flexibility to adjust mitigation actions based on documented effectiveness of implemented actions and the level of take projected by Band (2012) or Stochastic Collision Risk Assessment for Movement (or its successor), whichever is most appropriate for the proposed Project taking into account model limitations; • Current information regarding any impacts of offshore lighting on the species addressed in the opinion; and • The effectiveness of any minimization measures that have been implemented. Compensatory mitigation plan development and implementation should occur according to the following schedule: • At least 180 calendar days before the commissioning of the first WTG, BOEM should distribute a draft plan to BSEE and USFWS, appropriate state agencies, and other identified stakeholders or interested parties for a 60-calendar-day review period. • At least 90 calendar days before the commissioning of the first WTG, BOEM should transmit a revised compensatory mitigation plan for approval by BSEE and USFWS, along with a record of comments received on the draft plan. BOEM should rectify any outstanding agency comments or concerns before final approval by BOEM, BSEE, and USFWS. • Before or concurrent with the commissioning of the first WTG, BOEM should provide documentation to BSEE and USFWS showing financial, legal, or other binding commitment(s) to compensatory mitigation plan implementation. At least annually, BOEM, BSEE, USFWS, and the applicant should work together to assess the effectiveness of compensatory mitigation for collisions of listed birds with the proposed Project turbines. BOEM should take the lead in coordinating this effort. Appropriate state agencies should be invited to participate in these mitigation assessments. The first mitigation assessment should occur during construction, prior to the start of WTG commissioning. Subsequent mitigation assessments should be held concurrent with or shortly after the annual monitoring data review. Additional mitigation assessments (addressing minimization and/or compensatory mitigation) may be carried out at any time upon request by BOEM, BSEE, USFWS, appropriate state agencies, or the applicant, based on substantive new information or changed circumstances. These periodic mitigation assessments for the proposed Project may eventually be integrated into a regional or coastwide adaptive monitoring and impact minimization framework.		
NMFS EFH CRs issued on October 20, 2023[c]					
EFH CRs					
102.	Construction, Operations, Decommissioning	Recommendations to avoid and minimize adverse impacts on Atlantic cod (*Gadus morhua*) spawning	To minimize adverse impacts on Atlantic cod spawning aggregations within and adjacent to the proposed Project area and to reduce the risk of population-level impacts on this species, pile driving should not occur in the lease area from November 1 and March 31 of each year. To minimize adverse impacts on Atlantic cod spawning, in-water bottom disturbing construction activities, including dredging, cable laying and burying using jetting techniques or mechanical plow should not occur within the lease area or the OECC between Muskeget Channel and the lease area from November 1 through March 31 of each year. HRG sub-bottom profiling (e.g., sparkers, boomers) survey activities should not occur in the lease area between November 1 through March 31 of each year.	Finfish, Invertebrates, Essential Fish Habitat (3.6); Commercial Fisheries and For-Hire Recreational Fishing (3.9)	BOEM BSEE NMFS USACE

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			To minimize adverse impacts on Atlantic cod spawning habitats, NMFS recommends the development and implementation of passive acoustic and telemetry surveys within the lease area and the OECC to evaluate cod spawning activity within the proposed Project area. This should be conducted prior to, during, and post-construction to identify the full scope of the area affected by proposed Project construction and operations and assess individual, synergistic, and cumulative impacts of the proposed Project on cod spawning activity. Specifically, perform the following: a. Provide continuous monitoring of Atlantic cod spawning aggregations within, and immediately adjacent to, the lease area and the OECC between November 1 and March 31 prior to the construction of the proposed Project, during construction, and post-construction; b. Place additional passive acoustic receivers within the lease area and OECC to increase coverage; c. Add an additional glider to the ongoing survey to increase the spatial coverage and extend coverage within the proposed Project area and adjacent areas. The ongoing survey should focus on adding survey coverage (i.e., increase the number of glider tracts) within the proposed Project area to provide detection of cod spawning activity within the proposed Project area before, during, and after construction; d. The survey coverage should extend outside the lease area within areas where proposed Project impacts occur (e.g., wind wake impacts) to assess individual, synergistic and cumulative impacts of construction and operations on the distribution of cod spawning activity; and e. Data and results from this study should be made available to NOAA Fisheries HESD at NMFS.GAR.HESDoffshorewind@noaa.gov. To minimize impacts on benthic habitats and the proposed HAPC for Atlantic cod spawning, proposed areas including the WTGs, ESPs, inter-array cables, and the OECC identified as cod spawning locations based on pre-construction passive acoustic and telemetry surveys should be removed or relocated to avoid these areas.		
103.	Construction, Operations, Decommissioning	Recommendations to avoid and minimize impacts on longfin squid (*Doryteuthis pealeii*) and their designated EFH	To minimize adverse impacts on adult spawning and demersal early life stages of the longfin squid within Nantucket Shoals and the OECC, sediment-generating activities should be sequenced such that activities along the OECC in waters 50 meters in depth or less are avoided between May 1 and July 31 of any year.	Finfish, Invertebrates, Essential Fish Habitat (3.6); Commercial Fisheries and For-Hire Recreational Fishing (3.9)	BOEM BSEE NMFS USACE
104.	Construction, Operations, Decommissioning	Recommendations to minimize impacts on benthic habitats	1. To minimize adverse impacts on complex habitats within Muskeget Channel, including juvenile cod HAPC, the Western Muskeget Variant cable corridor should not be authorized and all cables should be consolidated within the Eastern Muskeget Channel corridor (i.e., Alternative C-1, Scenario 1). 2. WTGs, ESPs, and cables (inter-array and export) should be sited to avoid sensitive benthic habitats, including rocky habitats, SAV, and non-reef building hard corals. Soft bottom areas (identified by low multibeam backscatter returns) absent benthic features should be targeted for siting. 3. Develop and implement a WTG, ESP, and cable siting plan to facilitate the avoidance and minimization of impacts on sensitive benthic habitats. The plan should primarily use multibeam backscatter data, bathymetry, and boulder data layers to inform siting and/or micrositing. The plan should demonstrate/describe how impacts on sensitive benthic habitats were avoided and minimized. If avoidance and minimization was not feasible, the plans should describe in detail the rationale for this infeasibility. Additionally, the plan and maps depicting sensitive benthic habitats should be provided to vessel operators so that avoidance and minimization measures can be taken in real time. For areas where sensitive benthic habitats cannot be fully avoided through micrositing, the siting plan should avoid and minimize areas in the following order of preference: a. Complex habitats (i.e., areas of medium to high backscatter) with high density large boulders; b. Complex habitats (i.e., areas of medium to high backscatter) with medium density large boulders; c. Complex habitats (i.e., areas of medium to high backscatter) with low density large boulders; d. Complex habitats (i.e., areas of medium to high backscatter) with scattered large boulders; and e. Complex habitats (i.e., areas of medium to high backscatter) with no large boulders (≥0.5-meter diameter). A copy of the final plan should be provided to NOAA Fisheries HESD at NMFS.GAR.HESDoffshorewind@noaa.gov prior to construction. Following the completion of construction, HESD should be provided with post-construction information including how the plan was implemented. 4. To the extent practicable, if cables must cross complex habitat or benthic features (i.e., sand waves), they should be located at the narrowest points to cross perpendicularly to reduce the extent of sand wave leveling/dredging required; dredged material should not be disposed of within sensitive benthic habitats. 5. To minimize impacts on sensitive benthic habitats from boulder/cobble removal/relocation activities, boulders and cobbles should be: a. Relocated as close to the impact area as practicable, in areas immediately adjacent to existing similar complex bottom; b. Placed in a manner that does not hinder navigation or impede commercial fishing; and c. Avoid impacts on existing complex habitats. 6. In order to minimize impacts on sensitive benthic habitats from boulder/cobble removal/relocation activities, boulders that will be relocated using boulder "pick" methods should be relocated outside the area necessary to clear and placed along the edge of existing complex habitats such that the placement of the relocated boulders will result in a marginal expansion of complex habitats into soft-bottom habitats (identified by low multibeam backscatter returns). 7. Develop and implement a boulder relocation plan to facilitate the avoidance and minimization of impacts on sensitive benthic habitats. NMFS recommends that the plan use multibeam backscatter data and boulder layers (data) to inform micrositing. The plan should demonstrate/describe how impacts on sensitive benthic habitats and other elements (e.g., UXOs) were avoided and minimized. If avoidance and minimization was not feasible, the plans should describe in detail the rationale for this infeasibility. Additionally, all plans and maps depicting locations/extents of sensitive benthic habitats should be provided to vessel operators so that avoidance and minimization measures	Finfish, Invertebrates, Essential Fish Habitat (3.6); Commercial Fisheries and For-Hire Recreational Fishing (3.9)	BOEM BSEE NMFS USACE

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			can be taken in real time. A copy of the final plan should be provided to NOAA Fisheries HESD at NMFS.GAR.HESDoffshorewind@noaa.gov prior to construction. Following the completion of construction, HESD should also be provided with information on how the plan was implemented and locations of relocated boulders (as-built maps/figures). 8. To minimize impacts of benthic habitat modification, in all proposed Project areas where seafloor preparation activities include the use of plows, jets, grapnel runs, or similar methods, post-construction acoustic surveys (e.g., multibeam backscatter and side scan sonar) capable of detecting bathymetry changes of 0.5 meters or less should be completed to demonstrate how the bottom was modified by preparation and construction activities. Post-construction acoustic survey data should be provided to NOAA Fisheries HESD in a viewable format at NMFS.GAR.HESDoffshorewind@noaa.gov. 9. Avoid anchoring or placing jack-up barge spud cans or footings on/in sensitive benthic habitats, including any area where complex habitats or medium to high multibeam backscatter returns occur. 10. If anchoring is necessary in sensitive benthic habitats, anchor lines should be extended to the extent practicable to minimize the number of times the anchors must be raised and lowered to reduce the amount of habitat disturbance. 11. If anchoring must occur in any sensitive benthic habitats and vessels must remain stationary, dynamic positioning systems or mid-line buoys on anchor chains should be required to minimize impacts on those habitats. 12. Develop and implement an anchoring and jack-up barge plan to facilitate the avoidance and minimization of impacts on sensitive benthic habitats. NMFS recommends that the plan use multibeam backscatter data, bathymetry and boulder layers (data) to inform micrositing. If avoidance and minimization was not feasible, the plans should describe in detail the rationale for this infeasibility. Additionally, the plan and maps depicting locations/extents of sensitive benthic habitats should be provided to vessel operators so that avoidance and minimization measures can be taken in real time. A copy of the final plan should be provided to NOAA Fisheries HESD at NMFS.GAR.HESDoffshorewind@noaa.gov prior to construction. 13. To minimize permanent adverse impacts on existing benthic habitats from the placement of scour protection, all cables should be microsited to allow for full penetration/burial, regardless of habitat type (by siting cables in appropriate substrates). Additional bottom surveys should be conducted, as necessary, to inform the siting of the cables. 14. To minimize the impacts of habitat conversion from scour protection, natural or engineered rounded stone of consistent grain size that mimics natural seafloor substrates should be used. At a minimum, any exposed surface layer should be designed and selected to provide three-dimensional structural complexity that creates a diversity of crevice sizes (e.g., mixed stone sizes) and rounded edges (e.g., tumbled stone) and be sloped such that outer edges match the natural grade of the seafloor. Should the use of concrete mattresses be necessary, bioactive concrete (i.e., with bio-enhancing admixtures) should be used as the primary scour protection (e.g., concrete mattresses) or veneer to support biotic growth. 15. Develop and implement a scour protection plan to facilitate the avoidance and minimization of impacts on sensitive benthic habitats. NMFS recommends that the plan use multibeam backscatter data, bathymetry and boulder layers (data) to inform this plan. The plan should demonstrate/describe how impacts on sensitive benthic habitats (areas of medium to high backscatter return) were avoided and minimized in the selection and placement of scour protection. If avoidance and minimization was not feasible, the plans should describe in detail the rationale for this infeasibility. Additionally, the plan and maps depicting sensitive benthic habitats should be provided to vessel operators so that avoidance and minimization measures from scour protection placement can be taken in real time. A copy of the final plan should be provided to NOAA Fisheries HESD at NMFS.GAR.HESDoffshorewind@noaa.gov prior to construction. HESD should also be provided with post-construction information on: a. How the plan was implemented; b. The locations and type of scour protection depicted in as-built surveys/plans, maps, and figures; and c. Specific descriptions of how the types of scour protection were selected to mimic existing seafloor conditions. 16. Any debris encountered during a site preparation grapnel run should be retained and discarded at an appropriate upland facility. Debris should not be abandoned in place or be returned overboard. 17. Avoid direct and indirect impacts on SAV beds in Centerville Harbor and nearshore areas in the proposed landfall sites at Craigville Beach, Dowses Beach, and alternative sites; Covell's Beach and Wianno Avenue from cable installation; vessel anchoring; barge spud cans; and HDD exit pits through the following: a. Avoidance of SAV habitat should be based on surveys conducted no more than 1 year prior to the start of construction and use approved methods (i.e., Joint Federal Agency Submerged Aquatic Vegetation Survey Guidance for the New England Region 2016); b. Maps derived from SAV surveys should be provided to vessels/captains to ensure SAV is avoided; and c. A minimum of 100 feet (30 meters) between SAV and any construction activities (e.g., anchoring, equipment staging) should be maintained at all times. 18. In all inshore/shallow marine habitats where seafloor preparation and cable installation activities will occur, impacts on sensitive benthic habitats should be avoided and minimized through the use of HDD, micrositing, and rerouting. All disturbed areas should be restored to pre-construction conditions, inclusive of bathymetry, contours, and sediment types. Pre-construction surveys to determine conditions and post-construction surveys should be conducted to verify restoration has occurred. Survey results should be provided to NOAA Fisheries HESD at NMFS.GAR.HESDoffshorewind@noaa.gov. 19. To minimize impacts from vessel operation in estuarine/nearshore habitats, all vessels should float at all stages of the tide (i.e., avoid vessel grounding); all vessels should be required to follow other EFH CRs associated with anchoring/avoidance. 20. Trenching in open nearshore marine waters and the intertidal zone should be avoided.		

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			21. Dredged materials from HDD exit pits should be stored on a barge or on uplands and used to backfill the excavated areas or removed to a suitable upland disposal site if the material contains elevated levels of contaminants. HDD exit pits should be restored to pre-construction conditions with native and/or clean, compatible material once construction and installation is complete. 22. Frac-out plans should be developed for all areas where HDD is proposed to be used. NMFS recommends these plans be developed with particular attention to protecting SAV, which has been documented around Spindle Rock adjacent to the proposed Phase 1 landfall site at Craigville Public Beach and west of the proposed Phase 2 landfall site at Dowses Beach. A copy of the final plan should be provided to NOAA Fisheries HESD at NMFS.GAR.HESDoffshorewind@noaa.gov prior to construction. 23. Mitigation should be required for any impacts on designated HAPCs. Should the proposed Project unintentionally affect SAV through frac-out, anchoring in the SAV bed, cable installation, dredging, or other direct or indirect impacts from construction of the proposed Project, compensatory mitigation should be provided for all areas of SAV affected by construction activities, including cable installation and dredging. In addition, compensatory mitigation should be provided for impacts on juvenile Atlantic cod HAPC for the entire area of impact within the cable corridor routed through Muskeget Channel. A compensatory mitigation plan that satisfies each element of a complete compensatory mitigation plan as identified in 33 CFR Parts 325 and 332, Compensatory Mitigation for Losses of Aquatic Resources, and NOAA's Mitigation Policy for Trust Resources should be required for any impacts on SAV and juvenile Atlantic cod HAPC. Mitigation plans should be provided to NOAA Fisheries HESD at NMFS.GAR.HESDoffshorewind@noaa.gov for review and comment prior to construction.		
105.	Construction	Recommendations to minimize acoustic impacts	1. The use of noise mitigating measures should be required for any pile driving in the nearshore (e.g., HDD exit pit sediment containment) and offshore proposed Project areas (e.g., WTG and ESP installation), including the use of soft-start procedures and the deployment of noise-dampening equipment such as bubble curtains or double-bubble curtains. 2. A plan outlining the noise mitigation procedures for offshore activities should be filed with BOEM and USACE for approval before construction commences. The noise mitigation plan should include: a. Passive acoustic sound verification monitoring during pile driving activities; additional noise dampening technology should be applied if real-time monitoring indicate noise levels exceed the modeled 10 dB attenuation levels; b. A process for notifying NOAA Fisheries HESD within 24 hours if any evidence of a fish kill during construction activity is observed, as well as contingency plans to resolve issues; and c. Plans for acoustic monitoring of construction activities. BOEM should provide HESD with a copy of the final plan before in-water work begins, as well as acoustic monitoring reports associated with any/all noise-related monitoring. Plans and information should be submitted to HESD at NMFS.GAR.HESDoffshorewind@noaa.gov.	Finfish, Invertebrates, Essential Fish Habitat (3.6); Commercial Fisheries and For-Hire Recreational Fishing (3.9)	BOEM BSEE NMFS USACE
106.	Construction, Operations	Recommendations to address uncertainties and minimize impacts from proposed Project operations	1. The Benthic Habitat Monitoring Plan, dated December 2022, should be updated with the following: a. Include pre-construction/baseline monitoring for a minimum of 3 years prior to any construction activities and continue annually for a minimum of 5 years post-construction. b. Include invasive species (e.g., Didemnum vexillum) monitoring as a discrete component of the monitoring plan to track the fragmentation and spread of invasive species across the lease as a result of construction activities. c. Revise the targeted window for monitoring surveys to target the time of year with peak biomass, typically late summer/early fall, and prioritize surveying at the same time of year every year. d. Add "relocated boulder" as a third impact source stratification (similar to scour protection or offshore export cable) and update the power analysis accordingly for sampling locations needed across the OECC and SWDA to sufficiently sample across all three impact sources and identified habitat zones. e. Expand the proposed collection of post-construction acoustic data (multibeam bathymetry and backscatter and side scan sonar) to be proposed Project-wide to measure the total area subject to physical change as a result of proposed Project development. Post-construction acoustic surveys should be able to answer the following: i. How much soft-bottom habitat across the lease has been converted to hard bottom? ii. How much hardbottom habitat across the proposed Project has been converted to soft-bottom? iii. How much natural hard-bottom habitat across the proposed Project area has been converted into human-made hard-bottom? iv. How much total human-made hard bottom has been introduced into the proposed Project area? v. How many hard bottom habitats have been impacted (i.e., relocated, fragmented, reduced in complexity, etc.) by the proposed Project compared with pre-construction surveys? vi. Have sand wave habitats dredged and leveled during cable installation been restored or naturally recovered? 2. Develop an in situ specific monitoring program to address impacts of operations of the proposed Project on EFH and federally managed species. This monitoring recommendation is consistent with principles outlined in NOAA's Mitigation Policy for Trust Resources, which highlights the use of the best available scientific information, such as results of surveys and other data collection efforts when existing information is not sufficient for the evaluation of proposed actions and mitigation, or when additional information will facilitate more effective or efficient mitigation recommendations. Incorporation of this monitoring recommendation will further align the monitoring efforts of the proposed Project with the NOAA Fisheries and BOEM Federal Survey Mitigation Strategy, which has evaluation and integration of wind energy monitoring studies with NOAA Fisheries surveys as a primary goal. The proposed Project-specific monitoring program should measure in situ the stressors created by operations on the ecosystem from operational noise, EMF, wind wake impacts, and the presence of structures. Studies should also evaluate the biological impacts of those stressors on commercially important species in the proposed Project area such as longfin squid, Atlantic cod, American lobster, Atlantic sea scallops, black sea bass, golden tilefish, Jonah crab, monkfish, silver hake, scup, skates, and summer flounder. Monitoring plans should include the collection of a minimum of 3 years of baseline data during construction	Finfish, Invertebrates, Essential Fish Habitat (3.6); Commercial Fisheries and For-Hire Recreational Fishing (3.9)	BOEM BSEE NMFS USACE

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			and a minimum of 5 years of post-construction data collection. Plans should be incorporated into a comprehensive monitoring strategy and be provided to NOAA Fisheries GARFO and NEFSC for review and comment within 90 days of Record of Decision issuance. A response to NOAA Fisheries comments should be provided. All data and metadata resulting from research and monitoring studies should be provided to NOAA Fisheries. These monitoring studies should be developed in partnership with NOAA Fisheries and other scientific institutions to aid in addressing the following questions: a. How far do impacts on sound pressure, particle motion, and substrate vibration extend from the individual WTGs and the proposed Project collectively? i. What impact do these operational noise impacts have on the distribution of larvae for species with designated EFH in the proposed Project area and prey for these species (e.g., sand lance)? ii. What is the auditory environment pre- and post-construction and how does auditory exposure change within the lease area relative to distance from sound sources (WTGs)? How does exposure change with increasing distance from the lease area? b. What is the spatial distribution of the EMF emissions around inter-array and export cables? The proposed EMF study for the export cables should be expanded to measures EMF emissions from the inter-array cables and the export cables and address the following: i. What is the behavioral response to the altered EMF of fisheries resource species/life stages with known EMF-sensitivity? ii. Do EMF emissions affect the rate of settlement of juvenile fish species within designated juvenile cod HAPC in Muskeget Channel? iii. Do EMF emissions affect the habitat use or demersal egg distribution by longfin squid along the OECC? c. How far does the marine and atmospheric wind wake extend from the proposed Project during operations? i. What are the impacts on physical water column properties, primary and secondary production, and larval dispersal for species with designated EFH in the proposed Project area? ii. What is the distribution, abundance, survival, growth rate, and recruitment rate of larvae along a distance gradient from offshore wind structures? This should include an ichthyoplankton study that evaluates the impact of altered local hydrodynamic patterns around turbine foundations and the broad scale impacts of wind wakes on hydrodynamic patterns and larvae that extend beyond the footprint of the proposed Project. d. How does the presence of structures, scour protection, and introduction of engineered stone/riprap affect the natural mortality of species with EFH within the OECC and SWDA? i. Does the introduction of fragmented engineered stone/riprap across the SWDA increase the natural mortality of species with sensitive life stages, such as juvenile Atlantic cod, through increased predation exposure or other mechanisms? ii. Are juvenile settlement and/or survivorship rates affected as a result of construction, and the introduction of scour protection and cable armoring, within natural complex habitat along the OECC?		
107.	Construction, Operations, Decommissioning	Recommendations to minimize impacts from contaminants	1. The implementation of preventive measures should be required to reduce the risk of contaminant emissions or accidental release of chemicals. Such measures may include backup systems, secondary containments, closed loop systems, and/or recovery tanks. 2. Any anti-corrosion protection methods or systems proposed should be identified. If sacrificial anodes are used, Al anodes should be selected over Zn anodes. Any application of anti-corrosion coatings should be allowed to cure fully on land, and best management practices for reducing spills should be implemented if reapplied offshore.	Finfish, Invertebrates, Essential Fish Habitat (3.6); Commercial Fisheries and For-Hire Recreational Fishing (3.9)	BOEM BSEE NMFS USACE
108.	Construction, Operations, Decommissioning	Recommendations for reinitiation of consultations	i. The EFH consultation should be reinitiated prior to the permitting of any additional cable routes, such as the South Coast Variant, or the Covell's Beach (Phase 1) and Wianno Avenue (Phase 2) landfall sites, that were not contemplated in the EFH assessment but that are identified in the EIS. ii. The EFH consultation should be reinitiated prior to permitting if, based on surveys conducted no greater than 1 year prior to the start of construction, SAV beds are identified within 100 feet (30 meters) of any in-water construction activities, including cable installation, dredging, HDD exit pits, or vessel anchoring. iii. For Phase 2 of the proposed Project, the EFH consultation should be reinitiated if suction buckets are used to secure feet of the bottom frame foundations of WTGs or ESPs. Suction buckets are listed as an option for WTG and/or ESP installation, but the EFH assessment does not provide any information or evaluation of potential impacts on EFH or federally managed species. iv. The EFH consultation should be reinitiated prior to decommissioning turbines to ensure that the impact on EFH as a result of the decommissioning activities have been fully evaluated and minimized to the extent practicable. Pre-consultation coordination related to decommissioning should occur at least 5 years prior to proposed decommissioning.	Finfish, Invertebrates, Essential Fish Habitat (3.6); Commercial Fisheries and For-Hire Recreational Fishing (3.9)	BOEM BSEE NMFS USACE
Fish and Wildlife Coordination Act Recommendations – USACE jurisdiction					
109.	Construction, Operations, Decommissioning	NOAA Fisheries scientific surveys	The proposed Project should be required to mitigate the major impacts on NOAA Fisheries scientific surveys consistent with NOAA Fisheries-BOEM Federal Survey Mitigation Strategy – Northeast U.S. Region. The proposed Project's plans to mitigate these impacts at the project and regional levels should be provided to NOAA Fisheries for review and approval prior to BOEM's decision on its acceptance. Mitigation is necessary to ensure that NOAA Fisheries can continue to accurately, precisely, and timely execute our responsibilities to monitor the status and health of trust resources.	Finfish, Invertebrates, Essential Fish Habitat (3.6); Commercial Fisheries and For-Hire Recreational Fishing (3.9)	BOEM BSEE NMFS USACE

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110.	Construction, Operations,	Locations of boulders, berms, and protection measures	Locations of relocated boulders, created berms, and scour protection, including cable protection measures (e.g., concrete mattresses) should be provided to NOAA Fisheries, all other federal agencies with maritime jurisdiction, and the public as soon as possible to help inform all interested parties of potential gear obstructions.	Finfish, Invertebrates, Essential Fish Habitat (3.6); Commercial Fisheries and For-Hire Recreational Fishing (3.9)	BOEM BSEE NMFS USACE
RMPs, Terms and Conditions, and CRs from the NMFS BO Issued February 16, 2024					
RMPs					
111.	Construction	Minimize pile driving impacts	Effects to ESA listed species must be minimized and monitored during WTG and ESP foundation installation.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR)
112.	Construction	Minimize unexploded ordinances/ munitions of explosive concern (UXO/MEC) detonation impacts	Effects to ESA listed species must be minimized and monitored during UXO/MEC detonations.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
113.	Construction, Operations, Decommissioning	Minimize vessel Impacts	Effects to ESA listed sturgeon resulting from project vessel operations in the Delaware Bay and Delaware River must be monitored and reported.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
114.	Construction, Operations, Decommissioning	Reporting requirements	Effects to, or interactions with, ESA listed Atlantic sturgeon, whales, and sea turtles must be properly documented during all phases of the proposed action, and all incidental take must be reported to NMFS GARFO.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
115.	Construction, Operations, Decommissioning	Monitoring plans	Plans must be prepared that describe the implementation of activities or monitoring protocols for which the details were not available at the time this consultation was completed. All required plans must be submitted to NMFS GARFO in advance of the applicable activity with sufficient time for review, comment, and any required concurrence.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
116.	Construction, Operations, Decommissioning	Agency authority	BOEM, BSEE, NMFS OPR, and USACE must exercise their authorities to assess and ensure compliance with the implementation of measures to avoid, minimize, monitor, and report incidental take of ESA listed species during activities described in this Opinion. On-site observation and inspection must be allowed to gather information on the implementation of measures, and the effectiveness of those measures, to minimize and monitor incidental take during activities described in this Opinion, including its ITS.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
Terms and Conditions					
117.	Construction, Operations, Decommissioning	RPM 1 & 2	To implement the requirements of RPM 1 and 2, for ESA listed whales, Park City must comply with the measures specified in the proposed MMPA ITA (which are into the proposed action) as modified or supplemented in the final MMPA ITA, to minimize effects of foundation installation, UXO detonations, and other activities on ESA listed whales. To facilitate implementation of this requirement: A. BOEM must require, through an enforceable condition of their approval of Park City's COP for the New England Wind Project, Park City to comply with any measures for ESA-listed species included in the proposed ITA, which already have been incorporated into the proposed action, as modified or supplemented by the final MMPA ITA. B. NMFS OPR must ensure compliance with all mitigation measures as prescribed in the final ITA. NMFS expects this will be carried out through NMFS OPR's review of plans and monitoring reports, including interim and final SFV reports, submitted by Park City over the life of the MMPA ITA and taking any responsive action within its statutory and regulatory authority it deems necessary to ensure compliance with all final ITA mitigation measures based on the foregoing review. C. USACE must require, through an enforceable conditions of their individual permit authorizations, that Park City comply with any measures in the proposed MMPA ITA regarding ESA-listed marine mammals, which have already been incorporated into the proposed action, and as modified or supplemented by the final MMPA ITA. b. NMFS OPR must ensure compliance with all mitigation measures as prescribed in the final ITA. NMFS expects this will be carried out through NMFS OPR's review of	ESA-listed whales (3.7)	BOEM BSEE NMFS (OPR) USACE

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			plans and monitoring reports, including interim and final SFV reports, submitted by the applicant over the life of the MMPA ITA and taking any responsive action within its statutory and regulatory authority it deems necessary to ensure compliance with all final ITA mitigation measures based on the foregoing review. D. USACE must review the final MMPA ITA as issued by NMFS OPR and determine if an amendment or revision is necessary to the permit issued to The applicant by USACE to incorporate any new or revised measures for pile driving or related activities addressed in the USACE permit, to ensure compliance with any measures in the final MMPA ITA that are revised from, or in addition to, measures included in the proposed ITA, which have been incorporated into the proposed action; and, if necessary, exercise its regulatory authority to make appropriate amendments or revisions.		
118.	Construction	RPM 1	To implement the requirements of RPM 1, the following measures related to SFV for pile driving (inclusive of drilling) carried out for WTG and ESP foundation installation must be required by BOEM, BSEE, USACE, and implemented by Park City. The purpose of SFV and the steps outlined here are to ensure that Park City does not exceed the distances to the auditory injury (i.e., harm) or behavioral harassment threshold (Level A and Level B harassment respectively) for ESA listed marine mammals, the harm or behavioral harassment thresholds for sea turtles, or the harm or behavioral disturbance thresholds for Atlantic sturgeon as analyzed in the Opinion. These thresholds and the distances to them, identified and described in this Opinion, underpin the effects analysis, exposure analysis, and our determination of the amount and extent of incidental take anticipated and exempted in this ITS, including any determination that no incidental take is anticipated (i.e., for Atlantic sturgeon). The measures outlined here are based on the expectation that the initial pile driving methodology and sound attenuation measures (inclusive of impact pile driving, vibratory pile setting, and relief drilling) will result in noise levels that do not exceed the identified distances (as modeled assuming 10 dB attenuation; see Tables 7.1.10-7.1.13, 7.1.26, 7.1.27, 7.1.36) but, if that is not the case, provide a step-wise approach for modifying operations and/or modifying or adding sound attenuation measures that can reasonably be expected to avoid exceeding those thresholds for the next pile being driven. In all instances, any reference to jacket foundation also covers pile driven bottom frame foundations should that alternative foundation type be installed in Phase 2. These requirements are only in place for pile driven foundations (i.e., they do not apply to suction bucket foundations). A. BOEM, BSEE, and USACE must require, and Park City must develop a Sound Field Verification Plan, addressing Thorough and Abbreviated SFV, consistent with the requirements in Terms and Conditions 13.d below. Thorough SFV consists of: SFV measurements made at a minimum of four distances from the pile(s) being driven, along a single transect, in the direction of lowest transmission loss (i.e., projected lowest transmission loss coefficient), including, but not limited to, 750 meters and three additional ranges selected such that measurement of identified isopleths are accurate, feasible, and avoid extrapolation. At least one additional measurement at an azimuth 90 degrees from the array at approximately 750 meters must be made. At each measurement location, there must be a near-bottom and mid-water column hydrophone (measurement systems); the recordings must be continuous throughout the duration of all pile driving (inclusive of any relief drilling) of each foundation. Abbreviated SFV consists of: SFV measurements made at a single acoustic recorder, consisting of a near-bottom and mid-water hydrophone, at approximately 750 meters from the pile, in the direction of lowest transmission loss, to record sounds throughout the duration of all pile driving (inclusive of relief drilling) of each foundation. B. BOEM, BSEE, and USACE must require, and Park City must implement Thorough SFV, as detailed in 2c below, for at least the following foundations: i. First construction year: the first 3 monopiles installed with only an impact hammer; the first 3 monopiles installed with a vibratory hammer followed by an impact hammer; the first 2 jacket foundations (all piles) installed; the first foundation (regardless of type) where relief drilling is used; the first monopile and first jacket foundation (all piles) installed in December (winter sound speed profile); and, the first foundation for any foundation scenarios that were modeled for the exposure analysis (e.g., rated hammer energy, number of strikes, representative location) that does not fall into one of the previously listed categories (e.g., if the first two jacket foundation are installed with an impact hammer only, Thorough SFV would be required for the first jacket foundation installed with vibratory and impact pile driving). ii. Any subsequent construction year: a. if there are no changes to the pile driving equipment (i.e., same hammer, same NAS) – the first monopile and first jacket foundation (all piles); b. if a revised facility design report / fabrication and installation report or other information is submitted to BOEM and BSEE that details changes to the equipment (e.g., different hammer, different NAS) – thorough SFV requirements for the first construction year apply. c. any foundation type or technique included in the requirements for the first construction year that was not installed until a subsequent construction year (e.g., if drilling is not used until year 2 or 3, the first foundation where relief drilling is used must have thorough SFV). C. During Thorough SFV, installation of the next foundation (of the same type/foundation method) may not proceed until Park City has reviewed the initial results from the Thorough SFV and determined that there were no exceedances of any distances to the identified thresholds based on modeling assuming 10 dB attenuation. D. If any of the Thorough SFV measurements from any pile indicate that the distance to any isopleth of concern for any species is greater than those modeled assuming 10 dB attenuation, Park City must notify BOEM, BSEE, USACE, NMFS OPR, and NMFS GARFO within 24 hours of reviewing the Thorough SFV measurements and must implement the following measures for the next pile of the same type/installation methodology, as applicable. These requirements are in place for monopiles and jacket foundations and repeat until the criteria in 2.d.ii.a or 2.d.ii.b are met. i. Clearance and Shutdown Zones. If any of the Thorough SFV measurements indicate that the distances to level A thresholds for ESA listed whales (peak or cumulative) or permanent threshold shift peak or cumulative thresholds for sea turtles are greater than the modeled distances (assuming 10 dB attenuation, see Tables 7.1.10-7.1.13, 7.1.26, 7.1.27, 7.1.36), the clearance and shutdown zones (see Table 11.1) for subsequent piles of the same type (e.g., if triggered by SFV results for a monopile, for the next monopile) must be increased so that they are at least the size of the distances to those thresholds as indicated by SFV. For every 1,500 meters that a marine mammal clearance or shutdown zone is expanded, additional PSOs must be deployed from additional platforms/vessels to ensure adequate and complete monitoring of the expanded shutdown and/or clearance zone; Park City must deploy any additional PSOs consistent with the approved Pile Driving Monitoring Plan in consideration of the size of the new zones and the species that must be monitored (i.e., sea turtles and/or whales). Use of the expanded clearance and shutdown zones must continue for additional piles until Park City requests and receives concurrence from NMFS GARFO to revert to the original clearance and shutdown zones. ii. Attenuation Measures. Park City must identify one or more additional, modified, and/or alternative noise attenuation measure(s) and/or operational change(s) included in the approved SFV plan (see Terms and Conditions 13d) that is expected to reduce sound levels to the modeled distances and must implement that measure for the next pile of the same type and pile driving method that is installed (e.g., if triggered by SFV results for a monopile installed with vibratory pile driving followed by impact pile	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE

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			driving, for the next monopile with vibratory pile driving followed by impact pile driving). Attenuation measures that could reduce sound levels to the modeled distances include but are not limited to adding a noise attenuation device, adjusting hammer operations, and adjusting or otherwise modifying the noise mitigation system. Park City must provide written notification to BOEM, BSEE, USACE, NMFS OPR, and NMFS GARFO of the changes implemented within 24 hours of their implementation. a. If no additional, modified, and/or alternative measures or operational changes are identified for implementation, or if Thorough SFV of the third pile (of the same type and installation method; i.e., the pile installed with a second round of additional/modified noise attenuation or pile driving operations) indicates that the distance to any isopleths of concerns for any ESA listed species are still greater than those modeled assuming 10 dB attenuation, installation of that foundation type/installation methodology must be paused until there is concurrence from NMFS, BOEM, and BSEE to proceed. NMFS GARFO, NMFS OPR, BOEM, BSEE, and USACE will meet within three business days to discuss: the results of the Thorough SFV monitoring, the severity of exceedance of distances to identified isopleths of concern, the species affected, modeling assumptions, and whether any triggers for reinitiation of consultation are met (50 CFR 402.16), including consideration of whether the Thorough SFV results constitute new information revealing effects of the action that may affect listed species in a manner or to an extent not previously considered in the consultation. Implementation of additional measures to reduce noise and additional Thorough SFV may also be required as a result of this meeting. b. Following installation of a pile with additional, alternative, or modified noise attenuation measures/operational changes required by 2.d if Thorough SFV results indicate that all isopleths of concern are within distances to isopleths of concern modeled assuming 10 dB attenuation, Thorough SFV must be conducted on two additional piles of the same type/installation method (for a total of at least three piles with consistent noise attenuation measures). If the Thorough SFV results from all three of those piles are within the distances to isopleths of concern modeled assuming 10 dB attenuation, then BOEM, BSEE, and USACE must require, and Park City must continue to implement the approved additional, alternative, or modified sound attenuation measures/operational changes. Park City can request concurrence from NMFS GARFO and NMFS OPR to return to the original clearance and shutdown zones (Table 11.1). E. BOEM, BSEE, and USACE must require, and Park City must implement Abbreviated SFV for all piles for which the Thorough SFV monitoring outlined above is not carried out. Abbreviated SFV consists of: SFV measurements made at a single acoustic recorder, consisting of a near-bottom and mid-water hydrophone, at approximately 750 meters from the pile, in the direction of lowest transmission loss, to record sounds throughout the duration of all pile driving (inclusive of relief drilling) of each foundation. The Abbreviated SFV data collected will be used to compare to the thresholds defined as a result of Thorough SFV to assess whether the representative levels at approximately 750 meters were exceeded. i. Park City must review Abbreviated SFV results for each pile within 24 hours of completion of the foundation installation (inclusive of pile driving and any drilling), and, assuming measured levels at 750 meters did not exceed the thresholds defined during Thorough SFV, does not need to take any additional action. Results of Abbreviated SFV must be submitted with the weekly pile driving report. ii. If measured levels from Abbreviated SFV for any pile are greater than expected levels, Park City must evaluate the available information from the pile installation to determine if there is an identifiable cause of the exceedance (i.e., a failure of the NAS), identify and implement corrective action, and report this information to BOEM, BSEE, USACE, and NMFS GARFO within 48 hours of completion of the installation of the pile (inclusive of all pile driving and drilling), during which the exceedance occurred. If Park City can demonstrate that the exceedance was the result of a failure of the NAS (e.g., loss of a generator supporting a bubble curtain such that one bubble curtain failed during pile driving) that can be remedied in a way that returns the NAS to pre-failure conditions, Park City can request concurrence from BOEM, BSEE, NMFS OPR, and NMFS GARFO to proceed without thorough SFV monitoring that would otherwise be required within 72 hours. Park City is required to remedy any such failure of the NAS prior to carrying out any additional pile driving. iii. If results of Abbreviated SFV monitoring for any pile exceed expected values at 750 meters, Park City must resume Thorough SFV monitoring (as described in 2a above) for installation of the same foundation type and installation method within 72 hours after the completion of the pile driving with an exceedance. a. Park City can request concurrence from BOEM, BSEE, NMFS OPR, and NMFS GARFO to resume Abbreviated SFV monitoring following submission of an interim report from Thorough SFV that demonstrates ranges to the identified thresholds within expected values. Park City may automatically resume Abbreviated SFV monitoring if three consecutive Thorough SFV reports indicate ranges to regulatory thresholds within predicted values. Interim Thorough SFV monitoring reports must be submitted to BOEM, BSEE, USACE, NMFS OPR, and NMFS GARFO within 48 hours of completion of the monitored pile. b. If results from any Thorough SFV monitoring triggered by results from Abbreviated SFV indicate that ranges to the identified thresholds are larger than expected values, the requirements for Thorough SFV outlined in 2.a above apply (i.e., continuing Thorough SFV and implementing requirements for additional/modified attenuation measures). Additionally, BOEM, BSEE, USACE, NMFS OPR, and NMFS GARFO will meet within three business days to discuss: the results of SFV monitoring, the severity of exceedance of distances to identified isopleths of concern, the species affected, modeling assumptions, and whether any triggers for reinitiation of consultation are met (50 CFR 402.16), including consideration of whether the SFV results constitute new information revealing effects of the action that may affect listed species in a manner or to an extent not previously considered in the consultation. Additional measures and Thorough SFV may also be required as a result of this meeting.		
119.	Construction	RPM 2	To implement the requirements of RPM 2, the following measures must be required by BOEM, BSEE, and/or USACE and implemented by Park City: A. Establish a clearance zone for sea turtles extending 500 meters around any planned UXO/MEC detonations. Maintain the clearance zone for at least 60 minutes prior to any UXO/MEC detonation. This requirement clarifies the size of the clearance zone for sea turtles. Park City must ensure that there is sufficient PSO coverage to reliably document sea turtle presence within the clearance zone as described in the Marine Mammal and Sea Turtle Monitoring Plan (see Terms and Conditions 13a). In the event that a PSO detects a sea turtle inside the 500 meters clearance zone, detonation will be delayed until the sea turtle has not been observed for 30 minutes or has been observed to have left the clearance zone. B. Provide BOEM, BSEE, and NMFS GARFO with notification of planned UXO/MEC detonation as soon as possible but at least 48 hours prior to the planned detonation, unless this 48-hour notification would create delays to the detonation that would result in imminent risk of human life or safety. This notification must include the coordinates of the planned detonation, the estimated	Sea Turtles (3.8)	BOEM BSEE NMFS (OPR) USACE

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
120.	Construction	RPM 2	To implement the requirements of RPM 2, the following measures related to SFV for UXO/MEC detonation must be required by BOEM, BSEE, USACE, and implemented by Park City. The purpose of SFV and the steps outlined here are to ensure that Park City does not exceed the distances to the injury (i.e., harm) or harassment thresholds for ESA listed marine mammals, the permanent threshold shift or temporary threshold shift thresholds for sea turtles, or the onset of injury thresholds for Atlantic sturgeon that are identified in this Opinion and that underpin the effects analysis, exposure analysis and our determination of the amount and extent of incidental take exempted in this ITS, including the determination that no incidental take is anticipated in some cases. The measures outlined here are based on the expectation that Park City's initial UXO/MEC detonation methodology and sound attenuation measures will result in noise levels that do not exceed the identified distances to thresholds (as modeled assuming 10 dB attenuation) but, if that is not the case, provide a step-wise approach for modifying operations and/or modifying or adding sound attenuation measures that can reasonably be expected to avoid exceeding the distances to those thresholds prior to the next planned detonation. The steps outlined here reflect the proposed action which considers a total of no more than ten detonations. A. Consistent with the measures incorporated into the proposed action, BOEM, BSEE, and USACE must require and The applicant must implement SFV for all UXO/MEC detonations (see also Terms and Conditions 8.d. below) in accordance with the additional requirements specified here. If any of the SFV measurements from any detonation indicate that the distance to any isopleth of concern is greater than those modeled assuming 10 dB attenuation (see Tables 7.1.27, 7.1.40, 7.1.47), for the next detonation The applicant must implement the following measures as applicable: i. Clearance Zones. Clearance zones must be increased to reflect the results of SFV. For every 1,500 meters that a marine mammal clearance or shutdown zone is expanded, additional PSOs must be deployed from additional platforms/vessels to ensure adequate and complete monitoring of the expanded shutdown and/or clearance zone; Park City must deploy any additional PSOs consistent with the approved Pile Driving Monitoring Plan in consideration of the size of the new zones and the species that must be monitored (i.e., sea turtles and/or whales). Use of the expanded clearance and shutdown zones must continue for additional piles until Park City requests and receives concurrence from NMFS GARFO to revert to the original clearance and shutdown zones. ii. Attenuation Measures: Park City must identify one or more additional, modified, and/or alternative noise attenuation measures or other change to the detonation plans (included in the SFV Plan) that is expected to reduce sound levels to the modeled distances. These measures must be implemented for the next detonation. Park City must provide written notification to BOEM, BSEE, USACE, NMFS OPR, and NMFS GARFO of the changes planned for the next detonation within 24 hours of implementation. iii. If Park City determines that no additional measures or modifications are feasible for implementation following a UXO detonation where SFV measurements indicate that the distances to any identified isopleth of concern are greater than those modeled assuming 10 dB attenuation (see Tables 7.1.16, 7.1.17, 7.1.31, 7.1.32, 7.1.37), and NMFS, BOEM, BSEE, and USACE agree with that determination, NMFS GARFO, NMFS OPR, BOEM, BSEE, and USACE will meet within three business days to discuss: the results of SFV monitoring, the severity of exceedance of distances to identified isopleths of concern, the species affected, modeling assumptions, and whether any triggers for reinitiation of consultation are met (50 CFR 402.16), including consideration of whether the SFV results constitute new information revealing effects of the action that may affect listed species in a manner or to an extent not previously considered in the consultation. During that period, detonations must be delayed unless a delay would create an imminent risk to human life or safety.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
121.	Construction, Operations, Decommissioning	RPM 1 & 2	To implement the requirements of RPMs 1 and 2, BOEM, BSEE, and/or USACE must require that Park City inspect and carry out appropriate maintenance on the NAS prior to every foundation installation event (i.e., for each pile driven foundation) and UXO detonation and prepare and submit a NAS inspection/performance report to NMFS GARFO and NMFS OPR. For piles for which Thorough SFV is carried out, this report must be submitted as soon as it is available, but no later than when the interim SFV report is submitted for the respective pile. Performance reports for piles with Abbreviated SFV must be submitted with the weekly pile driving reports. For UXO detonations, the report must be submitted as soon as it is available, but no later than when the interim SFV report is submitted for the UXO detonation. All reports must be submitted by email to nmfs.gar.incidental-take@noaa.gov and submitted to BSEE through TIMSWeb. A. Performance reports for each bubble curtain deployed must include water depth, current speed and direction, wind speed and direction, bubble curtain deployment/retrieval date and time, bubble curtain hose length, bubble curtain radius (distance from pile), diameter of holes and hole spacing, air supply hose length, compressor type (including rated Cubic Feet per Minute and model number), number of operational compressors, performance data from each compressor (including Revolutions Per Minute, pressure, start times, and stop times), free air delivery (cubic meter per minute), total hose air volume (cubic meter per minute meter)), schematic of Global Positioning System waypoints during hose laying, maintenance procedures performed (pressure tests, inspections, flushing, re-drilling, and any other hose or system maintenance) before and after installation and timing of those tests, and the length of time the bubble curtain was on the seafloor prior to foundation installation. Additionally, the report must include any important observations regarding performance (before, during, and after pile installation or UXO detonation), such as any observed weak areas of low pressure. The report may also include any relevant video and/or photographs of the bubble curtain(s) operating during pile driving (inclusive of relief drilling), or UXO detonation.		
122.	Construction, Operations, Decommissioning	RPM 3	To implement the requirements of RPM 3, the following conditions must be implemented: A. BOEM, BSEE, and/or USACE must require that Park City document and report project vessel trips to/from ports in the Delaware River, including the number of vessel calls to the Paulsboro Marine Terminal. This must be included in the monthly project reports submitted to NMFS GARFO over the life of the project (see Terms and Conditions 9f. below). An annual summary of project vessel calls to Paulsboro must be submitted to NMFS GARFO (nmfs.gar.incidental-take@noaa.gov) and the USACE Philadelphia District (NAPRegulatory@usace.army.mil). B. BOEM, BSEE, and/or USACE must require that Park City implement the following reporting requirements for all project vessels transiting to/from ports in the Delaware River: i. Report any sturgeon observed with injuries or mortalities along the transit route in the Delaware Bay, Delaware River, or in the vicinity of the port that the vessel is calling on to NMFS within 24 hours by submitting the form available at: https://media.fisheries.noaa.gov/2021-07/Take%20Report%20Form%2007162021.pdf?null to nmfs.gar.incidental-take@noaa.gov.	Atlantic sturgeon and shortnose sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			ii. Collect any dead sturgeon observed in the vicinity of the port that the vessel is calling on and hold in cold storage until proper disposal procedures are discussed with NMFS GARFO. iii. Complete procedures for genetic sampling of any collected dead Atlantic sturgeon that are over 75 cm. More information on submitting genetic samples is included in Term and Condition 6a below. These requirements and instructions are consistent with the requirements of the RPMs and Terms and Conditions of the 2023 Paulsboro Opinion.		
123.	Construction	RPM 4	To implement the requirements of RPM 4, BOEM, BSEE, and/or USACE must require that Park City prepare and submit interim and final SFV reports to NMFS GARFO (nmfs.gar.incidental-take@noaa.gov) and BSEE (via TIMSWeb and notification email to protectedspecies@bsee.gov) as outlined here: A. SFV Interim Reports - Foundation Installation and UXO/MEC detonation. BOEM, BSEE, and USACE must require Park City to provide the initial results of the SFV measurements to NMFS GARFO and NMFS OPR in an interim report as soon as it is available but no later than 48 hours after the installation of each pile for which thorough SFV is carried out and for UXO detonation, no later than 48 hours after the detonation. If technical or other issues prevent submission within 48 hours, Park City must notify BOEM, BSEE, and NMFS GARFO within that 48-hour period with the reasons for delay and provide an anticipated schedule for submission of the report. The interim report must include data from hydrophones identified for interim reporting in the SFV Plan and include a summary of pile installation activities (pile diameter, pile weight, pile length, water depth, sediment type, hammer type, total strikes, total installation time [start time, end time], duration of pile driving, max single strike energy, NAS deployments), pile location, recorder locations, modeled and measured distances to thresholds, received levels (rms, peak, and SEL) results from Conductivity, Temperature, and Depth casts/sound velocity profiles, signal and kurtosis rise times, pile driving plots, activity logs, weather conditions. Additionally, any important sound attenuation device malfunctions (suspected or definite), must be summarized and substantiated with data (e.g., photos, positions, environmental data, directions, etc.). Such malfunctions include gaps in the bubble curtain, significant drifting of the bubble curtain, and any other issues which may indicate sub-optimal mitigation performance or are used by Park City to explain performance issues. Requirements for actions to be taken based on the results of the SFV are identified above. B. In addition to the requirements above, all Thorough SFV reports for foundation installation must include a table with levels expected at 750 meters for subsequent piles for which that thorough SFV is intended to represent (e.g., a 12 meters monopile installed with a 6,000-kJ hammer with just impact driving), to be compared against measurements from Abbreviated SFV monitoring. Expected single strike metrics are the maxima of the 95th-percentile of measured unweighted SPL, SEL, and Peak. The expected cumulative metric of unweighted SEL for all impact pile-driving strikes must also be reported and compared. These tables must include the highest levels from Thorough SFVs for which isopleths were calculated to be within modeled ranges, assuming 10 dB attenuation rounded up to the next integer decibel, both actual measurements at 750 meters, and fits based on measurements from recorders at other ranges. The highest levels in these tables, rounded to the next whole decibel, will be the "expected levels" to which Abbreviated SFV results must be compared. C. All Abbreviated SFV reports must include the results from the hydrophones at 750m and a comparison to the expected levels at 750 meters based on the previously completed thorough SFV for comparable pile type and installation method. Abbreviated SFV reports must be submitted with the weekly pile driving report. D. SFV Final Reports - The final results of Thorough SFV for monopile and pin pile installations must be submitted as soon as possible, but no later than within 90 days following completion of pile driving for which the Thorough SFV was carried out. The final results of Thorough SFV for UXO detonations must be submitted as soon as possible, but no later than within 90 days following completion of each UXO detonation. Within 60 days of the end of each construction season, Park City must compile and submit all final Abbreviated SFV reports.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
124.	Construction	RPM 4	To implement the requirements of RPM 4, BOEM, BSEE, and/or USACE must require that Park City file a report with NMFS GARFO (nmfs.gar.incidental-take@noaa.gov) and BSEE (via TIMSWeb and notification email to protectedspecies@bsee.gov) in the event that any ESA listed species is observed within the identified shutdown zone during active pile driving (vibratory or impact) or drilling. This report must be filed within 48 hours of the incident and include the following: description of the activity (i.e., drilling, vibratory or impact pile driving) and duration of pile driving or drilling prior to the detection of the animal(s), location of PSOs and any factors that impaired visibility or detection ability, time of first and last detection of the animal(s), distance of animal at first detection, closest point of approach of animal to pile, behavioral observations of the animal(s), time the PSO called for shutdown, hammer log (number of strikes, hammer energy), time the pile driving began and stopped, and any measures implemented (e.g., reduced hammer energy) prior to shut down. If shutdown was determined not to be feasible, the report must include an explanation for that determination and the measures that were implemented (e.g., reduced hammer energy).	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
125.	Construction, Operations, Decommissioning	RPM 4	To implement the requirements of RPM 4, BOEM, BSEE, USACE, must require Park City to implement the following reporting requirements necessary to document the amount or extent of incidental take that occurs during all phases of the proposed action. Unless otherwise specified all reports must be submitted to NMFS GARFO via e-mail (nmfs.gar.incidental-take@Noaa.gov) and BSEE via TIMSWeb. A. All observations or interactions with sea turtles or sturgeon that occur during the fisheries monitoring surveys must be reported within 48 hours to NMFS GARFO Protected Resources Division by email (nmfs.gar.incidental-take@noaa.gov) Take reports should reference the proposed Project and include the Take Report Form available on NMFS webpage (https://media.fisheries.noaa.gov/2021-07/Take%20Report%20Form%2007162021.pdf?null). Reports of Atlantic sturgeon take must include a statement as to whether a fin clip sample for genetic sampling was taken. Fin clip samples are required in all cases of interactions and handling of Atlantic sturgeon to document the distinct population segment of origin; the only exception to this requirement is when additional handling of the sturgeon would result in an imminent risk of injury to the fish or the survey personnel handling the fish: NMFS expects such incidents to be limited to capture and handling of sturgeon in extreme weather. Instructions for fin clips and associated metadata are available at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-take-reporting-programmatics-greater-atlantic, under the "Sturgeon Genetics Sampling" heading. B. All sightings or acoustic detections of NARWs must be reported immediately (no later than 24 hours). PAM detections and sightings of right whales with no visible injuries or entanglement must be reported as described in (i) below. Reporting requirements for suspected vessel strikes and injured/dead right whales are in (c) and (d) below.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			i. If a NARW is sighted with no visible injuries or entanglement or is detected via PAM at any time by project PSOs/PAM Operators or project personnel, Park City must immediately report the sighting or acoustic detection to NMFS; if immediate reporting is not possible, the report must be submitted as soon as possible but no later than 24 hours after the initial sighting or acoustic detection. a. To report the sighting or acoustic detection, download and complete the Real-Time North Atlantic Right Whale Reporting Template spreadsheet found here: https://www.fisheries.noaa.gov/resource/document/template-datasheet-real-time-north-atlantic-right-whale-acoustic-and-visual. Save the spreadsheet as a .csv file and email it to NMFS NEFSC-PSD (ne.rw.survey@noaa.gov), NMFS GARFO- Protected Resource Division (nmfs.gar.incidental-take@noaa.gov), and NMFS OPR (PR.ITP.MonitoringReports@noaa.gov). b. If unable to report a sighting through the spreadsheet within 24 hours, call the relevant regional hotline (Greater Atlantic Region [Maine through Virginia] Hotline 866-755-6622; Southeast Hotline 877-WHALE-HELP) with the observation information provided below (PAM detections are not reported to the Hotline). c. Observation information: Report the following information: the time (note time format), date (MM/DD/YYYY), location (latitude/longitude in decimal degrees; coordinate system used) of the observation, number of whales, animal description/certainty of observation (follow up with photos/video if taken), reporter's contact information, and lease area number/project name, PSO/personnel name who made the observation, and PSO provider company (if applicable) (PAM detections are not reported to the Hotline). d. If unable to report via the template or the regional hotline, enter the sighting via the WhaleAlert app (http://www.whalealert.org/). If this is not possible, report the sighting to the USCG via channel 16. The report to the Coast Guard must include the same information as would be reported to the Hotline (see above). PAM detections are not reported to WhaleAlert or the USCG. C. In the event of a suspected or confirmed vessel strike of any ESA listed species (e.g. marine mammal, sea turtle, listed fish) by any vessel associated with the Project or other means by which project activities caused a non-auditory injury or death of a ESA listed species, Park City must immediately report the incident to NMFS (at the phone numbers and email addresses identified below) and BSEE (via TIMSWeb and notification email to (protectedspecies@bsee.gov). Reports to NMFS must be made by phone and email: i. Phone: If in the Greater Atlantic Region (ME-VA): the NMFS Greater Atlantic Stranding Hotline (866-755-6622); in the Southeast Region (NC-FL): the NMFS Southeast Stranding Hotline (877-942-5343). ii. Email: GARFO (nmfs.gar.incidental-take@noaa.gov), and if in the Southeast region (NC-FL), also to NMFS Southeast Regional Office (secmammalreports@noaa.gov) The report must include: (A) Time, date, and location (coordinates) of the incident; (B) Species identification (if known) or description of the animal(s) involved (i.e., identifiable features including animal color, presence of dorsal fin, body shape and size); (C) Vessel strike reporter information (name, affiliation, email for person completing the report); (D) Vessel strike witness (if different than reporter) information (name, affiliation, phone number, platform for person witnessing the event); (E) Vessel name and/or Maritime Mobile Service Identify number; (F) Vessel size and motor configuration (inboard, outboard, jet propulsion); (G) Vessel's speed leading up to and during the incident; (H) Vessel's course/heading and what operations were being conducted (if applicable); (I) Part of vessel that struck whale (if known); (J) Vessel damage notes; (K) Status of all sound sources in use; (L) If animal was seen before strike event; (M) behavior of animal before strike event; (N) 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; (O) Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, visibility) immediately preceding the strike; (P) Estimated (or actual, if known) size and length of animal that was struck; (Q) Description of the behavior of the marine mammal immediately preceding and following the strike; (R) If available, description of the presence and behavior of any other marine mammals immediately preceding the strike; (S) Other animal details if known (e.g., length, sex, age class); (T) Behavior or estimated fate of the animal post-strike (e.g., dead, injured but alive, injured and moving, external visible wounds (linear wounds, propeller wounds, non-cutting blunt-force trauma wounds), blood or tissue observed in the water, status unknown, disappeared); (U) To the extent practicable, photographs or video footage of the animal(s); and (V) Any additional notes the witness may have from the interaction. For any numerical values provided (i.e., location, animal length, vessel length etc.), please provide if values are actual or estimated. D. In the event that any PSO or other project personnel, including any project vessel operator or crew, observe or identify a stranded, entangled, injured, or dead ESA listed species (e.g. marine mammal, sea turtle, listed fish), Park City must immediately report the observation to NMFS (by phone (marine mammals and turtles only) and email (marine mammal, sea turtle, listed fish) and BSEE (via TIMSWeb and notification email to (protectedspecies@bsee.gov): i. Phone: If in the Greater Atlantic Region (ME-VA):e NMFS Greater Atlantic Stranding Hotline (866-755-6622); in the Southeast Region (NC-FL) call the NMFS Southeast Stranding Hotline (877-942-5343). Note, the stranding hotline may request the report be sent to the local stranding network response team. ii. Email: if in the Greater Atlantic region (ME to VA) to GARFO (nmfs.gar.incidental-take@noaa.gov) or if in the Southeast region (NC-FL) to NMFS Southeast Regional Office (secmammalreports@noaa.gov). The report must include: (A) Contact information (name, phone number, etc.), time, date, and location (coordinates) of the first discovery (and updated location information if known and applicable); (B) Species identification (if known) or description of the animal(s) involved; (C) Condition of the animal(s) (including carcass condition if the animal is dead); (D) Observed behaviors of the animal(s), if alive; (E) If available, photographs or video footage of the animal(s); and (F) 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, which may include coordination of transport to shore, particularly for injured sea turtles. E. Park City must compile and submit weekly reports during each month that foundation installation occurs that document: the foundation/pile ID, type of pile, pile diameter, start and finish time of each drilling and pile driving event, hammer log (number of strikes, max hammer energy, duration of piling) per pile, any changes to NASs and/or hammer schedule, details on the deployment of PSOs and PAM operators, including the start and stop time of associated observation periods by the PSOs and PAM Operators, and a record of all observations/detections of marine mammals and sea turtles including time (UTC) of sighting/detection, species ID, behavior, distance (meters) from vessel to animal at time of sighting/detection (meters), animal distance (meters) from pile installation vessel, vessel/project activity at time of sighting/detection, platform/vessel name, and mitigation measures taken (if any) and reason. Sightings/detections during pile driving activities (clearance, active pile driving, post-pile driving) and all other (transit, opportunistic, etc.) sightings/detection must be reported and identified as such. The weekly reports must also confirm that the required SFV was carried out for each pile and that results were reviewed on the required timelines. Abbreviated SFV reports must be appended to the weekly report. These weekly reports must be submitted to		

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			NMFS GARFO (nmfs.gar.incidental-take@noaa.gov), BOEM, and BSEE by Park City or the PSO providers and can consist of quality assurance/quality controlled raw data. Weekly reports are due on Wednesday for the activities occurring the previous week (Sunday - Saturday, local time). F. Starting in the first month that in-water activities occur (e.g., cable installation, fisheries surveys), Park City must compile and submit monthly reports that include a summary of all project activities carried out in the previous month, including dates and location of any fisheries surveys carried out, vessel transits (name, type of vessel, number of transits, vessel activity, and route (origin and destination, including transits from all ports, foreign and domestic), cable installation activities (including sea to shore transition), number of foundations installed and pile IDs, UXO detonation, and all sightings/detections of ESA listed whales, sea turtles, and sturgeon. Sightings/detections must include species ID, time, date, initial detection distance, vessel/platform name, vessel activity, vessel speed, bearing to animal, project activity, and any mitigation measures taken as a result of those observations. These reports must be submitted to NMFS GARFO (nmfs.gar.incidental-take@noaa.gov) and BSEE (TIMSWeb and protectedspecies@bsee.gov) and are due on the 15th of the month for the previous month. G. Park City must submit to NMFS GARFO (nmfs.gar.incidental-take@noaa.gov) an annual report describing all activities carried out to implement their Fisheries Research and Monitoring Plan. This report must include a summary of all activities conducted, the dates and locations of all fisheries surveys, including location and duration for all trawl surveys summarized by month, number of vessel transits inclusive of port of origin and destination, and a summary table of any observations and captures of ESA listed species during these surveys. The report must also summarize all acoustic telemetry and benthic monitoring activities that occurred, inclusive of vessel transits. Each annual report is due by February 15 (i.e., the report for 2024 activities is due by February 15, 2025). BOEM and BSEE must require Park City to submit full detection data, metadata, and location of recorders (or Global Positioning System tracks, if applicable) from all real-time hydrophones used for monitoring during construction within 90 calendar days after the completion of foundation installation and UXO detonations have ended for the calendar year (i.e., if the last foundation of construction year 1 is installed on November 30, the report is due by March 1 of the following year). Reporting must use the webform templates on the NMFS Passive Acoustic Reporting System website at https://www.fisheries.noaa.gov/resource/document/passive-acoustic-reporting-system-templates. BOEM and BSEE, must require Park City to submit the full acoustic recordings from all the real-time hydrophones to the National Centers for Environmental Information for archiving within 90 calendar days after pile-driving has ended and instruments have been pulled from the water. Archiving guidelines outlined here (https://www.ncei.noaa.gov/products/passive-acoustic-data#tab-3561) must be followed. Confirmation of both submittals must be sent to NMFS GARFO via email.		
126.	Construction, Operations, Decommissioning	RPM 4	To implement the requirements of RPM 4 and to facilitate monitoring of the incidental take exemption for sea turtles, BOEM, BSEE, USACE, and NMFS must meet twice annually to review sea turtle observation records. These meetings/conference calls will be held in September (to review observations through August of that year) and December (to review observations from September to November) and will use the best available information on sea turtle presence, distribution, and abundance, proposed Project vessel activity, and observations to estimate the total number of sea turtle vessel strikes in the action area that are attributable to proposed Project operations.	Sea Turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
127.	Construction	RPM 4	To implement the requirements of RPM 4, within 10 business days of BOEM, BSEE, and/or USACE obtaining updated information on project plans (e.g., as obtained through a relevant facility design report and/or fabrication and installation report, or other submission), BOEM, BSEE, and/or USACE must provide NMFS GARFO (nmfs.gar.incidental-take@noaa.gov) with the following information: number, size, and type of foundations to be installed to support WTGs and ESPs for each project; the proposed construction schedule (i.e., months when pile driving is planned) for each project, and any available updates on anticipated vessel transit routes (e.g., any changes to the ports identified for use by project vessels, confirmation of location of operations and maintenance facility) that will be used by project vessels. This information may be provided in separate submissions for Project 1 and Project 2. NMFS GARFO will review this information and, to the maximum extent practicable, within 10 business days of receipt will request a meeting with BOEM, BSEE, and USACE if there is any indication that there are changes to the proposed action that would cause an effect to listed species or critical habitat that was not considered in this Opinion, including the amount or extent of predicted take, such that any potential trigger for reinitiation of consultation can be discussed with the relevant action agencies.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
128.	Operations	RPM 4	To implement RPM 4 for trawl surveys: A. At least one of the survey staff onboard the trawl survey vessels must have completed NMFS NEFOP training within the last 5 years or other training in protected species identification and safe handling (inclusive of taking genetic samples from Atlantic sturgeon); documentation of training must be submitted to NMFS GARFO at least 7 calendar days prior to the start of the trawl surveys and at any later time that a different NEFOP trained observer is deployed on the survey. B. If Park City or their contractors will deploy non-NEFOP trained survey personnel in lieu of NEFOP-trained observers, BOEM, BSEE, and/or Park City must submit a plan to NMFS describing the training that will be provided to those survey observers. This Observer Training Plan for Trawl Surveys must be submitted as soon as possible after issuance of this Opinion but no later than 15 calendar days prior to the start of trawl surveys for which a non-NEFOP trained observer will be deployed. BOEM, BSEE, and Park City must obtain NMFS GARFO's concurrence with this observer training plan prior to the deployment of the non-NEFOP trained observer on any trawl surveys. This plan must include a description of the elements of the training (i.e., curriculum, virtual or hands on, etc.) and identify who will carry out the training and their qualifications. Once the training is complete, confirmation of the training and a list of trained survey staff must be submitted to NMFS; this list must be updated if additional staff are trained for future surveys. In all cases, a list of trained survey staff must be submitted to NMFS at least one business day prior to the beginning of the survey.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
129.	Construction	RPM 5	To implement RPM 5, BOEM, BSEE, and/or USACE must require, and Park City must prepare and submit the plans identified below in sufficient time to allow for review and any required approval prior to the planned start date for the associated activities. All plans must be submitted to NMFS GARFO at nmfs.gar.incidental-take@noaa.gov as well as to BOEM (renewable_reporting@boem.gov), BSEE (via TIMSWeb with a notification email to protectedspecies@bsee.gov), and USACE (cenae-r-@usace.army.mil). A. Any of the identified plans can be combined such that a single submitted plan addresses multiple requirements provided that the plan clearly identifies which requirements it is addressing. B. Within 60 days of issuance of this BO, Park City must schedule a meeting with NMFS GARFO to: review the plan requirements, discuss the review/approval process, and develop a schedule for when plans can be expected to be submitted for review.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			C. Between 30 and 90 days before the planned start of foundation installation each year, Park City must meet with NMFS GARFO, BOEM, BSEE, USACE, and NMFS OPR to review the construction plans and schedule for the upcoming construction season, and review requirements for reporting and notification protocols, and Thorough and Abbreviated SFV requirements. D. All plans must be submitted at least 180 days in advance of the planned start of relevant activities (e.g., the foundation installation monitoring plan must be submitted at least 180 days before the planned date for installation of the first pile). For each plan, within 45 calendar days of receipt of the plan, NMFS GARFO will provide comments to BOEM, BSEE, and Park City, including a determination as to whether the plan is consistent with the requirements outlined in this ITS and/or in Section 3 of this Opinion. If the plan is complete and is determined to be consistent with the identified requirements, NMFS GARFO will provide concurrence with the plan. If the plan is determined to be inconsistent with these requirements (e.g., if required information is missing), Park City must resubmit a modified plan that addresses the identified issues within 30 days of the receipt of the comments. For all subsequent drafts, Park City must provide for at least 10 day calendar days for review and comment. i. Marine Mammal and Sea Turtle Monitoring Plan – Foundation Installation and UXO/MEC detonation. BOEM, BSEE, and/or Park City must submit this Plan (or Plans if separate plans are prepared for foundation installation and UXO/MEC detonation) to NMFS GARFO at least 180 calendar days before the respective activity is planned to begin (i.e., if foundation installation or UXO detonation is planned for May 1, the plan must be submitted no later than November 1 of the preceding year). BOEM, BSEE, and Park City must obtain NMFS GARFO's concurrence with this Plan(s) prior to the start of any drilling or pile driving for foundation installation and before any UXO/MEC detonation. a. The Plan(s) must include: a description of how all relevant mitigation and monitoring requirements contained in the ITS and those included as part of the proposed action will be implemented; a pile driving installation summary and sequence of events; a description of all monitoring equipment and evidence (i.e., manufacturer's specifications, reports, testing) that it can be used to effectively monitor and detect ESA listed marine mammals and sea turtles in the identified clearance and shutdown zones (i.e., field data demonstrating reliable and consistent ability to detect ESA listed large whales and sea turtles at the relevant distances in the conditions planned for use); communications and reporting details; and PSO monitoring and mitigation protocols (including number and location of PSOs) for effective observation and documentation of sea turtles and ESA listed marine mammals during all foundation installation events and UXO/MEC detonations. b. The Plan(s) must demonstrate sufficient PSO and PAM Operator staffing (in accordance with watch shifts), PSO and PAM Operator schedules, and contingency plans for instances if additional PSOs and PAM Operators are required including any expansion of clearance and/or shutdown zones that may be required as a result of SFV. c. The Plan(s) must contain a thorough description of how Park City will monitor foundation installation activities (drilling, vibratory and impact pile driving) during reduced visibility conditions (e.g. rain, fog) and in other low visibility conditions, including proof of the efficacy of monitoring devices (e.g., mounted thermal/infrared camera systems, hand-held or wearable night vision devices, spotlights) in detecting ESA listed marine mammals and sea turtles over the full extent of the required clearance and shutdown zones, including demonstration that the full extent of the minimum visibility zones can be effectively and reliably monitored. The Plan must identify the efficacy of the technology at detecting marine mammals and sea turtles in the clearance and shutdown zones under all the various conditions anticipated during construction, including varying weather conditions, sea states, and in consideration of the use of artificial lighting. d. The Plan must contain a thorough description of how Park City will monitor foundation installation activities during daytime when unexpected changes to lighting or weather occur during pile driving that prevent visual monitoring of the full extent of the clearance and shutdown zones. e. The plan must describe how Park City would determine the number of sea turtles exposed to noise above the 175 dB harassment threshold during foundation installation and how Park City would determine the number of ESA listed whales exposed to noise above the Level B harassment threshold during foundation installation and UXO detonation (in consideration of modeling that indicates that distances to the level B harassment threshold may extend beyond the clearance and shutdown zones being monitored by PSOs). ii. Nighttime Monitoring Plan – Foundation Installation. BOEM, BSEE, and/or Park City must submit this Plan to NMFS GARFO at least 180 calendar days before foundation installation is planned to begin. This plan can be included as a sub-section of the Marine Mammal and Sea Turtle Monitoring Plan addressed above or as a stand-alone plan. This Plan(s) must contain a thorough description of how Park City will monitor foundation installation activities (drilling, vibratory and impact pile driving) and at night, including proof of the efficacy of monitoring devices (e.g., mounted thermal/infrared camera systems, hand-held or wearable night vision devices, spotlights) in detecting ESA listed marine mammals and sea turtles over the full extent of the required clearance and shutdown zones, including demonstration that the full extent of the minimum visibility zones can be effectively and reliably monitored. The Plan must identify the efficacy of the technology at detecting marine mammals and sea turtles in the clearance and shutdown zones under all the various conditions anticipated during construction, including varying weather conditions, sea states, and in consideration of the use of artificial lighting. If the plan does not include a full description of the proposed technology, monitoring methodology, and data demonstrating to NMFS GARFO's satisfaction that marine mammals and sea turtles can reliably and effectively be detected within the clearance and shutdown zones for monopiles and jacket foundations before and during foundation installation (drilling, vibratory and impact pile driving), nighttime foundation installation may not occur; the only exception would be if safety necessitates continuing pile installation after dark for a foundation that was initiated 1.5 hours prior to civil sunset, in which case the Low Visibility components of the Pile Driving Monitoring Plan would be implemented. iii. PAM Plan for Pile Driving and UXO/MEC Detonation. BOEM, BSEE, and/or Park City must submit this Plan to NMFS GARFO at least 180 calendar days before either Pile Driving or UXO/MEC detonation is planned. This plan can be included as a sub-section of the Marine Mammal and Sea Turtle Monitoring Plan addressed above. BOEM, BSEE, and Park City must obtain NMFS GARFO's concurrence with this Plan prior to the start of any foundation installation or UXO/MEC Detonation. The Plan must include a description of all proposed PAM equipment and hardware, the calibration data, bandwidth capability and sensitivity of hydrophones, and address how the proposed PAM will follow standardized measurement, processing methods, reporting metrics, and metadata standards for offshore wind (Van Parijs et al. 2021). The Plan must describe and include all procedures, documentation, and protocols including information (i.e., testing, reports, equipment specifications) to support that it will be able to detect vocalizing whales within the clearance and shutdown zones, including deployment locations, procedures, detection review methodology, and protocols; hydrophone detection ranges with and without foundation installation activities and data supporting those ranges; communication time between call and detection, and data transmission rates between PAM Operator and PSOs on the pile driving vessel; where PAM Operators will be stationed relative to hydrophones and		

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			PSOs on pile driving vessel calling for delay/shutdowns; and a full description of all proposed software, call detectors, and filters. The Plan must also incorporate the requirements relative to NARW reporting in Terms and Conditions 9. iv. Sound Field Verification Plan - Foundation Installation and UXO/MEC detonation. BOEM, BSEE, and USACE must require Park City to submit this Plan (or Plans if separate Foundation Installation and UXO/MEC plans are prepared) to NMFS GARFO at least 180 calendar days before pile driving for foundations and UXO/MEC detonation is planned to begin. BOEM, BSEE, and Park City must obtain NMFS GARFO's concurrence with this Plan(s) prior to the start of foundation installation and UXO detonations. The Plan must detail all plans and procedures for sound attenuation, including procedures for adjusting and optimizing the NAS(s), maintenance procedures and timelines, and detail the available contingency noise attenuation measures/systems if distances to modeled isopleths of concern are exceeded (as documented during SFV). a. Foundation Installation: The plan must describe how Park City will conduct the required Thorough SFV (Terms and Conditions 1a) for each of the required foundation types, installation methodologies, and locations. In the case that the foundation sites planned for Thorough SFV are determined to not be representative of all other foundation installation sites for a scenario, Park City must include information on how additional sites will be selected for Thorough SFV. Park City must provide justification for why these locations are representative of the scenario modeled. The plan must describe how Park City will conduct the required Abbreviated SFV, inclusive of requirements to review results within 24 hours and triggers for Thorough SFV. The Plan must provide a table of the identification number and coordinates of each foundation location, and specify the underwater acoustics analysis model scenario against which each foundation location's SFV results will be compared. The Plan(s) must also include the piling schedule and sequence of events, communication and reporting protocols, and methodology for collecting, analyzing, and preparing SFV data for submission to NMFS, including instrument deployment, locations of all hydrophones (including direction and distance from the pile), hydrophone sensitivity, recorder/measurement layout, and analysis methods. The Plan must also identify the number and distance of relative location of hydrophones for Thorough and Abbreviated SFV. The plan must include a template of the interim report to be submitted and describe the all the information that will be reported in the SFV Interim Reports including the number, location, depth, distance, and predicted and actual isopleth distances that will be included in the final report(s). The Plan must describe how the interim SFV report results will be evaluated against the modeled results, including which modeled scenario the results will be reported against, and include a decision tree of what happens if measured values exceed predicted values. The Plan must address how Park City will implement the measures associated with the required SFV which includes, but is not limited to, identifying additional or modified noise attenuation measures (e.g., additional noise attenuation device, adjust hammer operations, adjust or modify the noise mitigation system) that will be applied to reduce sound levels if measured distances are greater than those modeled as well as implementation of any expanded clearance or shutdown zones, including deployment of additional PSOs. b. UXO Detonation: The plan must describe how Park City will conduct the required Thorough SFV for all planned UXO detonations (Terms and Conditions 4). Thorough SFV consists of: SFV measurements made at a minimum of four distances from the detonation, along a single transect, in the direction of lowest transmission loss (i.e., projected lowest transmission loss coefficient), including, but not limited to, 750 meters and three additional ranges selected such that measurement of identified isopleths are accurate, feasible, and avoid extrapolation. At least one additional measurement at an azimuth 90 degrees from the array at approximately 750 meters must be made. At each location, there must be a near bottom and mid-water column hydrophone (measurement systems). The Plan must describe how the interim SFV report results will be evaluated against the modeled results and decision tree of what happens if measured values exceed predicted values. The Plan must address how Park City will implement the measures associated with the required SFV which includes, but is not limited to, identifying additional or modified noise attenuation measures (e.g., additional noise attenuation device, adjust hammer operations, adjust or modify the noise mitigation system) that will be applied to reduce sound levels if measured distances are greater than those modeled as well as implementation of any expanded clearance or shutdown zones, including deployment of additional PSOs. i. Vessel Strike Avoidance Plan. Park City must submit this plan to NMFS GARFO as soon as possible after issuance of this BO but no later than 180 days prior to the planned mobilization of any vessels operated by or under contract to the applicant for the New England Wind Project (i.e., any vessel associated with construction, operations and maintenance, or decommissioning activities described in this Opinion). The Plan must include: an acknowledgement of the vessels that are subject to the plan; all relevant mitigation and monitoring measures for listed species inclusive of a summary of all applicable vessel speed and approach restrictions in different operational areas; vessel-based observer protocols for transiting vessels; communication and reporting plans; and a description of proposed alternative monitoring equipment to allow lookouts/PSOs to observe vessel strike avoidance zones in varying weather conditions, sea states, darkness, and in consideration of the use of artificial lighting. NMFS GARFO will review this plan and identify any inconsistencies with the requirements for vessel strike avoidance required by regulation or otherwise incorporated into the proposed action considered in the BO. With the exception noted below, NMFS GARFO's concurrence with this plan is not required prior to vessel mobilization. a. If Park City plans to implement PAM in any transit corridor to allow vessel transit above 10 knots, Park City must prepare a plan (a standalone plan or supplement to the Vessel Strike Avoidance Plan) that describes: the location of each transit corridor (with a map); how PAM, in combination with visual observations, will be conducted to ensure highly effective monitoring for the presence of right whales in the transit corridor; and, the protocols that will be in place for vessel speed restrictions following detection of a right whale via PAM or visual observation. This plan must be provided to NMFS GARFO for review at least 180 days in advance of planned deployment of the PAM system. PAM information should follow what is required to be submitted for the PAM Plan in Terms and Conditions 13.c. BOEM, BSEE, and Park City must receive NMFS GARFO's concurrence with this plan prior to implementation of the PAM-monitored transit corridor.		
130.	Construction, Operations, Decommissioning	RPM 6	To implement the requirements of RPM 6, BOEM, BSEE, NMFS OPR, and USACE must exercise their authorities to assess the implementation of measures to avoid, minimize, monitor, and report incidental take of ESA listed species during activities described in this Opinion. These agencies shall immediately exercise their respective authorities to take effective action to ensure prompt implementation and compliance if Park City is not complying with: any avoidance, minimization, and monitoring measures incorporated into the proposed action or any term and condition(s) specified in this statement, as currently drafted or otherwise amended in agreement between these agencies and NMFS; if agencies fail to do so, the protective coverage of Section 7(o)(2) may lapse.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
131.	Construction, Operations, Decommissioning	RPM 6	To implement the requirements of RPM 6, Park City must consent to on-site observation and inspections by Federal agency personnel (including NOAA personnel) during activities described in the BO, for the purposes of evaluating the effectiveness and implementation of measures designed to minimize or monitor incidental take.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
132.	Construction, Operations, Decommissioning	RPM 6	To implement the requirements of RPM 6, Park City, BOEM, BSEE, NMFS OPR, and USACE must immediately notify NMFS GARFO of any identified or suspected non-compliance with any measure outlined in this ITS or in any measure incorporated into the proposed action, including measures included in the Final MMPA authorization. This includes the suspected or identified failure in effectiveness of any such measure. This notification must be submitted as soon as the issue is identified to nmfs.gar.incidental-take@noaa.gov and must include a description of the non-compliance or failure of effectiveness of the measure, the date the issue was identified, and any corrective actions that were taken. The report of non-compliance must be followed within 48 hours with a request to meet with NMFS GARFO to discuss the report and seek concurrence from NMFS GARFO on the corrective measures. Neither the applicant nor any action agency may interfere with any reporting to NMFS by a PSO or other personnel of any identified or suspected non-compliance with any such measures or any identified or suspected incidental take.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
CRs					
133.	Construction	CR 1	Work with the applicant to develop a construction schedule that further reduces potential exposure of NARWs to noise from pile driving including avoiding impact pile driving and UXO detonation in May and December.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
134.	Operations	CR 2	Collect data to add to the limited information on underwater noise generated during operations of the direct drive wind turbines in the action area. i. A study to document operational noise of WTGs during a variety of wind and weather conditions should be carried out.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
135.	Construction, Operations, Decommissioning	CR 3	Support research and development of technology to aid in the minimization of risk of vessel strikes on marine mammals, sea turtles, and Atlantic sturgeon.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
136.	Construction, Operations, Decommissioning	CR 4	Support development of regional monitoring of project and cumulative effects through the Regional Wildlife Science Collaborative for Offshore Wind.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
137.	Construction, Operations, Decommissioning	CR 5	Work with the NEFSC to support robust monitoring and study design with adequate sample sizes, appropriate spatial and temporal coverage, and proper design allowing the detection of potential impacts of offshore wind projects on a wide range of ecological and oceanographic conditions including protected species distribution, prey distribution, pelagic habitat, and habitat usage.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
138.	Construction, Operations, Decommissioning	CR 6	Support research into understanding the effects of offshore wind on regional oceanic and atmospheric conditions through modeling and data collection, and assessment of potential impacts on protected species, their habitats, and distribution of zooplankton and other prey.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
139.	Operations	CR 7	Support the continuation of aerial surveys for post-construction monitoring of listed species in the SWDA and surrounding waters, and methods for survey adaptation to the presence of wind turbines.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
140.	Construction, Operations	CR 8	Support research on construction and operational impacts to protected species distribution, particularly the NARW and other listed whales. Conduct monitoring pre/during/post construction, including long-term monitoring during the operational phase, including sound sources associated with turbine maintenance (e.g., service vessels), to understand any changes in protected species distribution and habitat use in southern New England.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
141.	Construction, Operations, Decommissioning	CR 9	Support the deployment of acoustic tags on sea turtles and sturgeon and deployment and maintenance of a receiver array in the SWDA and surrounding waters.	Atlantic sturgeon (3.6), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
142.	Construction, Operations, Decommissioning	CR 10	Support research regarding the abundance and distribution of Atlantic sturgeon in the SWDA and surrounding region in order to understand the distribution and habitat use and aid in density modeling efforts, including the continued use of acoustic telemetry networks to monitor for tagged fish.	Atlantic sturgeon (3.6)	

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
143.	Construction, Operations, Decommissioning	CR 11	Require the applicant to send all acoustic telemetry metadata and detections to the Mid-Atlantic Acoustic Telemetry Observation System database via https://matos.asascience.com/ for coordinated tracking of marine species over broader spatial scales in U.S. Animal Tracking Network and Ocean Tracking Network.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
144.	Construction, Operations, Decommissioning	CR 12	Conduct or support long-term ecological monitoring to document the changes to the ecological communities on, around, and between foundations and other benthic areas disturbed by the proposed Project.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
145.	Construction, Operations, Decommissioning	CR 13	Develop or support the development of a PAM array in the SWDA to monitor changes in ambient noise and use of the area by baleen whales (and other marine mammals) during the life of the Project, including construction, and to detect small-scale changes at the scale of the SWDA. Bottom mounted recorders should be deployed at a maximum of 20 kilometers distance from each other throughout the given study area in order to ensure near to complete coverage of the area over which NARWs and other baleen whales can be heard. See Van Parijs et al. 2021 for specific details. Resulting data products should be provided according to https://www.fisheries.noaa.gov/resource/document/passive-acoustic-reporting-system-templates.	Marine mammals (3.7)	BOEM BSEE NMFS (OPR) USACE
146.	Construction, Operations, Decommissioning	CR 14	Support the development of a regional PAM network across lease areas to monitor long-term changes in baleen whale distribution and habitat use. A regional PAM network should consider adequate array/hydrophone design, equipment, and data evaluation to understand changes over the spatial scales that are relevant to these species for the duration of these projects, as well as the storage and dissemination of these data.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
147.	Construction, Operations, Decommissioning	CR 15	Monitor changes in commercial fishing activity to detect changes in bycatch or entanglement rates of protected species, particularly the NARW, and support the adaptation of ropeless fishing practices where necessary. Conduct regular surveys and removal of marine debris from project infrastructure.	Commercial Fisheries and For-Hire Recreational Fishing (3.9), Marine mammals (3.7)	BOEM BSEE NMFS (OPR) USACE
148.	Construction, Operations, Decommissioning	CR 16	Provide support to groups that participate in regional stranding networks.	Atlantic sturgeon (3.6), Marine mammals (3.7), and sea turtles (3.8)	BOEM BSEE NMFS (OPR) USACE
Draft NMFS Proposed Incidental Take Regulations Pursuant to the MMPA Issued to BOEM for Consideration on June 8, 2023[d]					
General Conditions					
149.	Construction	General Conditions	1. A copy of any issued LOA must be in the possession of the applicant and its designees, all vessel operators, visual PSOs, PAM operators, pile driver operators, and any other relevant designees operating under the authority of the issued LOA; 2. The applicant must conduct briefings between construction supervisors, construction crews, and the PSO and PAM team prior to the start of all in-water construction activities and when new personnel join the work, in order to explain responsibilities, communication procedures, marine mammal monitoring and reporting protocols, and operational procedures. A simple guide must be included with the Marine Mammal Monitoring Plan to aid personnel in identifying species if they are observed in the vicinity of the project area; 3. Prior to and when conducting any in-water activities and vessel operations, the applicant's personnel and contractors (e.g., vessel operators, PSOs) must use available sources of information on NARW presence in or near the project area including daily monitoring of the Right Whale Sightings Advisory System, and monitoring of Coast Guard VHF Channel 16 throughout the day to receive notification of any sightings and/or information associated with any Slow Zones (i.e., DMAs and/or acoustically-triggered slow zones) to provide situational awareness for both vessel operators, PSO(s), and PAM operators; 4. The applicant must ensure that any visual observations of an ESA-listed marine mammal are communicated to on-duty PSOs, PAM operator(s), and vessel captains during the concurrent use of multiple project-associated vessels (of any size; e.g., construction surveys, crew/supply transfers, etc.); 5. The applicant must establish and implement clearance and shutdown zones as described in the LOA; 6. The applicant must instruct all vessel personnel regarding the authority of the PSO(s). Any disagreement between the Lead PSO and the vessel operator would only be discussed after shutdown has occurred; 7. If an individual from a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized take number has been met, is observed entering or within the relevant Level B harassment zone for a specified activity, pile driving (e.g., impact and vibratory), drilling, and HRG acoustic sources must shut down immediately, unless shutdown would result in imminent risk of injury or loss of life to an individual, pile refusal, or pile instability, or be delayed if the activity has not commenced. Pile driving, drilling, UXO/MEC detonations, and initiation of HRG acoustic sources must not commence or resume until the animal(s) has been confirmed to have left the Level B harassment zone or the observation time has elapsed with no further sightings; 8. Foundation Installation (i.e., impact and vibratory pile driving, drilling), UXO/MEC detonation, and HRG survey activities shall only commence when visual clearance zones are fully visible (e.g., not obscured by darkness, rain, fog, etc.) and clear of marine mammals, as determined by the Lead PSO, for at least 30 minutes immediately prior to initiation of equipment (i.e., vibratory and impact pile driving, drilling, UXO/MEC detonations, and HRG surveys that use boomers, sparkers, and Compressed High-Intensity Radiated Pulses);	Marine mammals (3.7)	BOEM BSEE NMFS

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			9. In the event that a large whale is sighted or acoustically detected that cannot be confirmed as a non-NARW, it must be treated as if it were an NARW; 10. For in-water construction heavy machinery activities other than foundation installation, if a marine mammal is on a path towards or comes within 10 meters of equipment, the applicant must cease operations until the marine mammal has moved more than 10 meters on a path away from the activity to avoid direct interaction with equipment; 11. All vessels must be equipped with a properly installed, operational AIS device and the applicant must report all Maritime Mobile Service Identify numbers to NMFS OPR prior to initiating in-water activities; and 12. Confirmation of all required training must be documented on a training course log sheet and reported to NMFS OPR.		
150.	Construction, Operations, Decommissioning	Vessel strike avoidance measures	1. Prior to the start of the Project's activities involving vessels, all vessel operators and crew must receive a protected species identification training that covers, at a minimum: i. Identification of marine mammals and other protected species known to occur or which have the potential to occur in the applicant's project area; ii. Training on making observations in both good weather conditions (i.e., clear visibility, low winds, low sea states) and bad weather conditions (i.e., fog, high winds, high sea states, with glare); iii. Training on information and resources available to the project personnel regarding the applicability of Federal laws and regulations for protected species; and iv. Training related to vessel strike avoidance measures must be conducted for all vessel operators and crew prior to the start of in-water construction activities. 2. All vessel operators and crews, regardless of their vessel's size, must maintain a vigilant watch for all marine mammals and slow down, stop their vessel, or alter course, as appropriate, to avoid striking any marine mammal; 3. All transiting vessels operating at any speed must have a dedicated visual observer on duty at all times to monitor for marine mammals within a 180 degree direction of the forward path of the vessel (90 degrees port to 90 degree starboards) located at the best vantage point for ensuring vessels are maintaining appropriate separation distances from marine mammals. Visual observers must be equipped with binoculars and alternative monitoring technology for periods of low visibility (e.g., darkness, rain, fog, etc.). The dedicated visual observer must receive prior training on protected species detection and identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements. Visual observers may be NMFS-approved PSOs or crew members. Observer training related to these vessel strike avoidance measures must be conducted for all vessel operators and crew prior to the start of vessel use; 4. Year-round and when a vessel is in transit, all vessel operators must continuously monitor USCG VHF Channel 16, over which NARW sightings are broadcasted. At the onset of transiting and at least once every 4 hours, vessel operators and/or trained crew members must monitor the project's Situational Awareness System, WhaleAlert, and the Right Whale Sighting Advisory System for the presence of NARWs. Any observations of any large whale by any of the applicant's staff or contractors, including vessel crew, must be communicated immediately to PSOs, PAM operator, and all vessel captains to increase situational awareness. Conversely, any large whale observation or detection via a sighting network (e.g., Mysticetus) by PSOs or PAM operators must be conveyed to vessel operators and crew; 5. Any observations of any large whale by any applicant staff or contractor, including vessel crew, must be communicated immediately to on-duty PSOs, PAM operators, and all vessel captains to increase situational awareness; 6. Nothing in this subpart exempts vessels from applicable speed regulations at 50 CFR 224.105; 7. All vessels must transit active Slow Zones (i.e., DMAs) or acoustically-triggered slow zone), and SMAs at 10 knots or less; 8. All vessels, regardless of vessel size, must immediately reduce speed to 10 knots or less when any large whale, mother/calf pairs, or large assemblages of non-delphinid cetaceans are observed (within 500 meters) of an underway vessel; 9. All vessels, regardless of size, must immediately reduce speed to 10 knots or less when a NARW is sighted, at any distance, by anyone on the vessel; 10. All vessels must comply with NARW approach restrictions at 50 CFR 224.103(c). 11. All vessels must maintain a minimum separation distance of 100 meters from sperm whales and baleen whales other than NARWs. If one of these species is sighted within 100 meters of a transiting vessel, that vessel must shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 100 meters; 12. All vessels must maintain a minimum separation distance of 50 meters from all delphinoid cetaceans and pinnipeds with an exception made for those that approach the vessel (i.e., bow-riding dolphins). If a delphinid cetacean or pinniped is sighted within 50 meters of a transiting vessel, that vessel must shift the engine to neutral, with an exception made for those that approach the vessel (e.g., bow-riding dolphins). Engines must not be engaged until the animal(s) has moved outside of the vessel's path and beyond 50 meters; 13. When a marine mammal(s) is sighted while a vessel is transiting, the vessel must take action as necessary to avoid violating the relevant separation distances (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 a marine mammal(s) is sighted within the relevant separation distance, the vessel must shift the engine to neutral and not engage the engine(s) until the animal(s) is outside and on a path away from the separation area. This does not apply to any vessel towing gear or any situation where respecting the relevant separation distance would be unsafe (i.e., any situation where the vessel is navigationally constrained); 14. All vessels underway must not divert or alter course to approach any marine mammal. If a separation distance is triggered, any vessel underway must avoid abrupt changes in course direction and transit at 10 knots or less until the animal is outside the relevant separation distance; and 15. The applicant must submit a North Atlantic right whale Vessel Strike Avoidance Plan 180 days prior to the commencement of vessel use. This plan must describe, at a minimum, how PAM, in combination with visual observations, would be conducted to ensure the transit corridor is clear of right whales and would also provide details on the vessel-based observer.	Marine mammals (3.7)	BOEM BSEE NMFS

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
151.	Construction	WTG and ESP foundation installation measures	1. Impact pile driving, vibratory pile driving, and drilling (i.e., foundation installation) must not occur January 1 through April 30; Vibratory pile driving must not occur in May and December. Impact pile driving and drilling must not be planned in December; however, it may occur in the case of unforeseen circumstances and with approval by NMFS; 2. Monopiles must be no larger than 13-meters in diameter. Pin piles must be no larger than 4 meters in diameter. During all monopile and pin pile installation, the minimum amount of hammer energy necessary to effectively and safely install and maintain the integrity of the piles must be used. Hammer energies must not exceed 6,000 kJ for monopile installations and 3,500 kJ for pin pile installation. No more than two monopiles or four pin piles may be installed per day; 3. The applicant must utilize a soft-start protocol for each impact pile driving event of all foundations by performing 4–6 strikes per minute at 10 to 20 percent of the maximum hammer energy, for a minimum of 20 minutes; 4. Soft-start must occur at the beginning of monopile and pin pile impact driving and at any time following a cessation of impact pile driving of 30 minutes or longer; 5. At least four PSOs must be actively observing marine mammals before, during, and after installation of foundation piles (i.e., monopiles and pin piles). At least two PSOs must be stationed and observing on the pile driving vessel and at least two PSOs must be stationed on a secondary, PSO-dedicated vessel. Concurrently, at least one PAM operator must be actively monitoring for marine mammals with PAM before, during, and after impact pile driving; 6. PSOs must visually clear (i.e., confirm no marine mammals are present) the entire minimum visibility zone and the entire clearance zone (when conditions all for visibility of the entire clearance zone) for a full 30 minutes immediately prior to commencing pile driving or drilling; 7. If a marine mammal is detected, visually or acoustically, within or about to enter the applicable clearance zones, prior pile driving or drilling, activities must be delayed until the animal has been visually observed exiting the clearance zone or until a specific time period has elapsed with no further sightings. The specific time periods are 15 minutes for small odontocetes and pinnipeds and 30 minutes for all other species; i. For piles installed between May 1–May 14 and November 1–December 30, if a NARW is observed or acoustically detected within 10 kilometers of the pile being driven, pile driving must be delayed or stopped (unless activities must proceed for human safety or installation feasibility concerns) and may not resume until the following day or until the animal is confirmed to have exited the zone via aerial or additional vessel surveys; (8) The applicant must deploy dual NASs that are capable of achieving, at a minimum, 10 dB of sound attenuation, during all pile driving and drilling of monopiles and pin piles and comply with the following requirements related noise abatement: ii. A single bubble curtain must not be used unless paired with another noise attenuation device; iii. A big double bubble curtain may be used without being paired with another noise attenuation device; iv. The bubble curtain(s) must distribute air bubbles using an air flow rate of at least 0.5 cubic meter per minute meter. The bubble curtain(s) must surround 100 percent of the piling perimeter throughout the full depth of the water column. In the unforeseen event of a single compressor malfunction, the offshore personnel operating the bubble curtain(s) must make appropriate adjustments to the air supply and operating pressure such that the maximum possible sound attenuation performance of the bubble curtain(s) is achieved; v. The lowest bubble ring must be in contact with the seafloor for the full circumference of the ring, and the weights attached to the bottom ring must ensure 100-percent seafloor contact; vi. No parts of the ring or other objects may prevent full seafloor contact; vii. Construction contractors must train personnel in the proper balancing of airflow to the ring. Construction contractors must submit an inspection/performance report for approval by the applicant within 72 hours following the performance test. The applicant must then submit that report to NMFS OPR; and viii. Corrections to the bubble ring(s) to meet the performance standards in this paragraph (c)(8) must occur prior to impact pile driving of monopiles and pin piles. If the applicant uses a noise mitigation device in addition to the bubble curtain, the applicant must maintain similar quality control measures as described in this paragraph (c)(8). 8. At least one PAM operator must review data from at least 24 hours prior to pile driving and actively monitor hydrophones for 60 minutes prior to pile driving. All clearance zones must be acoustically confirmed to be free of marine mammals for 60 minutes before activities can begin immediately prior to starting a soft-start of impact pile driving. PAM operators will continue to monitor for marine mammals for at least 30 minutes after pile driving or drilling concludes; 9. For NARWs, any visual observation or acoustic detection must trigger a delay to the commencement of pile driving. The clearance zone may only be declared clear if no confirmed NARW acoustic detections (in addition to visual) have occurred within the PAM clearance zone during the 60-minute monitoring period. Any large whale sighting by a PSO or detected by a PAM operator that cannot be identified by species must be treated as if it were a NARW; 10. If a marine mammal is observed entering or within the respective shutdown zone after pile driving has begun, the PSO must call for a shutdown of pile driving or drilling. The applicant must stop pile driving or drilling immediately unless shutdown is not practicable due to imminent risk of injury or loss of life to an individual or risk of damage to a vessel that creates risk of injury or loss of life for individuals or the lead engineer determines there is pile refusal or pile instability. In any of these situations, the applicant must reduce hammer energy to the lowest level practicable and the reason(s) for not shutting down must be documented and reported to NMFS; 11. If pile driving has been shut down due to the presence of a NARW, pile driving may not restart until the NARW is no longer observed or 30 minutes has elapsed since the last detection; 12. If pile driving has been shut down due to the presence of a marine mammal other than a NARW, pile driving must not restart until either the marine mammal(s) has voluntarily left the specific clearance zones and has been visually or acoustically confirmed beyond that clearance zone, or, when specific time periods have elapsed with no further sightings or acoustic detections have occurred. The specific time periods are 15 minutes for small odontocetes and 30 minutes for all other marine mammal species. In cases where these criteria are not met, pile driving may restart only if necessary to maintain pile stability at which time the applicant must use the lowest hammer energy practicable to maintain stability;	Marine mammals (3.7)	BOEM BSEE NMFS

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			13. The applicant must conduct SFV during all foundation installation activities: i. The applicant must conduct SFV during all activities associated with the first three monopile foundations and the first two jacket foundations installed. Subsequent SFV is required should additional piles be driven that are anticipated to produce louder sound fields than those previously measured; ii. The applicant must conduct SFV during drilling the first time it occurs; iii. The applicant must determine source levels, spectra, the ranges to the isopleths corresponding to Level A harassment and Level B harassment thresholds, and transmission loss coefficient(s); iv. The applicant must perform sound field measurements at a minimum of four distances from the pile being driven in one direction (towards deepest waters), including, but not limited to, 750 meters and the modeled Level B harassment zones assuming 10 dB attenuation to verify the accuracy of those modeled zones and contribute to improvement of the models. At least one additional measurement at a different azimuth must be taken to capture sound propagation variability; v. The recordings must be continuous throughout the duration of all pile driving and drilling of each foundation monitored; vi. The measurement systems must have a sensitivity appropriate for the expected sound levels from pile driving received at the nominal ranges throughout the installation of the pile; vii. The frequency range of the system must cover the range of at least 20 Hz to 20 kHz; viii. The system must be designed to have omnidirectional sensitivity and so that the broadband received level of all pile driving and drilling activities exceeds the system noise floor by at least 10 dB. The dynamic range of the system must be sufficient such that at each location, pile driving signals are not clipped and are not masked by noise floor; ix. If acoustic field measurements collected during installation of foundation piles indicate ranges to the isopleths, corresponding to Level A harassment and Level B harassment thresholds, are greater than the ranges predicted by modeling (assuming 10 dB attenuation), the applicant must implement additional noise mitigation measures prior to installing the next foundation. Additional acoustic measurements must be taken after each modification; x. In the event that field measurements indicate ranges to isopleths, corresponding to Level A harassment and Level B harassment thresholds, are greater than the ranges predicted by modeling (assuming 10 dB attenuation) after implementing additional noise mitigation measures, NMFS OPR may expand the relevant harassment, clearance, and shutdown zones and associated monitoring protocols; xi. If acoustic measurements indicate that ranges to isopleths corresponding to the Level A harassment and Level B harassment thresholds are less than the ranges predicted by modeling (assuming 10 dB attenuation), the applicant may request to NMFS OPR a modification of the clearance and shutdown zones. For NMFS OPR to consider a modification request for reduced zone sizes, the applicant must have had to conduct SFV on an additional three foundations and that subsequent foundations would be installed under conditions that are predicted to produce smaller harassment zones than those measured; xii. The applicant must conduct SFV after construction is complete to estimate turbine operational source levels based on measurements in the near and far-field at a minimum of three locations from each foundation monitored. These data must be used to also identify estimated transmission loss rates; and xiii. (xiii) The applicant must submit an SFV plan to NMFS OPR for review and approval at least 180 days prior to planned start of foundation installation activities.		
152.	Construction,	UXO / MEC detonation measures	1. Upon encountering a UXO/MEC, the applicant may only resort to high-order removal (i.e., detonation) if all other means of removal are impracticable and this determination must be documented and submitted to NMFS; 2. UXO/MEC detonations must not occur from December 1 through May 31, annually; however, the applicant may detonate a UXO/MEC in December or May with NMFS' approval on a case-by-case basis; 3. UXO/MEC detonations must only occur during daylight hours; 4. No more than one detonation can occur within a 24-hour period; 5. The applicant must deploy dual NASs during all UXO/MEC detonations and comply with the following requirements related to noise abatement: i. A single bubble curtain must not be used unless paired with another noise attenuation device; ii. A big double bubble curtain may be used without being paired with another noise attenuation device; iii. The bubble curtain(s) must distribute air bubbles using an air flow rate of at least 0.5 cubic meter per minute meter. The bubble curtain(s) must surround 100 percent of the UXO/MEC detonation perimeter throughout the full depth of the water column. In the unforeseen event of a single compressor malfunction, the offshore personnel operating the bubble curtain(s) must make appropriate adjustments to the air supply and operating pressure such that the maximum possible sound attenuation performance of the bubble curtain(s) is achieved; iv. The lowest bubble ring must be in contact with the seafloor for the full circumference of the ring, and the weights attached to the bottom ring must ensure 100-percent seafloor contact; v. No parts of the ring or other objects may prevent full seafloor contact; vi. Construction contractors must train personnel in the proper balancing of airflow to the ring. Construction contractors must submit an inspection/performance report for approval by the applicant within 72 hours following the performance test. The applicant must then submit that report to NMFS OPR; and vii. Corrections to the bubble ring(s) to meet the performance standards in this paragraph (d)(5) must occur prior to UXO/MEC detonations. If the applicant uses a noise mitigation device in addition to the bubble curtain, the applicant must maintain similar quality control measures as described in this paragraph (d)(5);	Marine mammals (3.7)	BOEM BSEE NMFS

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			6. The applicant must conduct SFV during all UXO/MEC detonations at a minimum of three locations (at two water depths at each location) from each detonation in a direction toward deeper water in accordance with the following requirements: i. The applicant must empirically determine source levels (peak and cumulative sound exposure level), the ranges to the isopleths corresponding to the Level A harassment and Level B harassment thresholds in meters, and the transmission loss coefficient(s). The applicant may estimate ranges to the Level A harassment and Level B harassment isopleths by extrapolating from in situ measurements conducted at several distances from the detonation location monitored; ii. The measurement systems must have a sensitivity appropriate for the expected sound levels from detonations received at the nominal ranges throughout the detonation; iii. The frequency range of the system must cover the range of at least 20 Hz to 20 kHz; and iv. The system will be designed to have omnidirectional sensitivity and will be designed so that the predicted broadband received level of all UXO/MEC detonations exceeds the system noise floor by at least 10 dB. The dynamic range of the system must be sufficient such that at each location, pile driving signals are not clipped and are not masked by noise floor. 7. The applicant must submit an SFV plan to NMFS OPR for review and approval at least 180 days prior to planned start of detonation activities; 8. Applicant must establish and implement clearance zones for UXO/MEC detonation using both visual and acoustic monitoring, as described in the LOA; 9. Applicant must use at least two visual PSOs on a platform (e.g., vessels, plane) and one PAM operator to monitor for marine mammals in the clearance zones prior to detonation. If the clearance zone is larger than 2 kilometers (based on charge weight), applicant must deploy a secondary PSO vessel or aircraft. If the clearance is larger than 5 kilometers (based on charge weight), an aerial survey must be conducted; 10. At least four PSOs must be actively observing marine mammals before and after any UXO/MEC detonation. At least two PSOs must be stationed and observing on a vessel as close as possible to the detonation site and at least two PSOs must be stationed on a secondary, PSO-dedicated vessel or aerial platform. Concurrently, at least one acoustic monitoring PSO (i.e., PAM operator) must be actively monitoring for marine mammals with PAM before, during, and after detonation; 11. At least one PAM operator must review data from at least 24 hours prior to a detonation and actively monitor hydrophones for 60 minutes prior to detonation. All clearance zones must be acoustically confirmed to be free of marine mammals for 60 minutes prior to commencing a detonation. PAM operators will continue to monitor for marine mammals at least 30 minutes after a detonation; 12. All clearance zones must be visually confirmed to be free of marine mammals for 30 minutes before a detonation can occur. All PSOs will also maintain watch for 30 minutes after the detonation event; 13. If a marine mammal is observed entering or within the relevant clearance zone prior to the initiation of a detonation, detonation must be delayed and must not begin until either the marine mammal(s) has voluntarily left the specific clearance zones and have been visually and acoustically confirmed beyond that clearance zone, or, when specific time periods have elapsed with no further sightings or acoustic detections. The specific time periods are 15 minutes for small odontocetes and 30 minutes for all other marine mammal species; and 14. For NARWs, any visual observation or acoustic detection must trigger a delay to the detonation of a UXO/MEC. Any large whale sighting by a PSO or detected by a PAM operator that cannot be identified by species must be treated as if it were a NARW.		
153.	Construction	HRG survey measures	1. The applicant is required to have at least one PSO on active duty per HRG vessel during HRG surveys that are conducted during daylight hours (i.e., from 30 minutes prior to civil sunrise through 30 minutes following civil sunset) and at least two PSOs on active duty per vessel during HRG surveys that are conducted during nighttime hours; 2. The applicant must deactivate acoustic sources during periods where no data are being collected, except as determined to be necessary for testing. Unnecessary use of the acoustic source(s) is prohibited; 3. The applicant is required to ramp-up SBPs prior to commencing full power, unless the equipment operates on a binary on/off switch, and ensure visual clearance zones are fully visible (e.g., not obscured by darkness, rain, fog, etc.) and clear of marine mammals, as determined by the Lead PSO, for at least 30 minutes immediately prior to the initiation of survey activities using acoustic sources specified in the LOA; 4. Prior to a ramp-up procedure starting or activating SBPs, the operator must notify the Lead PSO of the planned start time. This notification time must not be less than 60 minutes prior to the planned ramp-up or activation as all relevant PSOs must monitor the clearance zone for 30 minutes prior to the initiation of ramp-up or activation; 5. Prior to starting the survey and after receiving confirmation from the PSOs that the clearance zone is clear of any marine mammals, the applicant must ramp-up sources to half power for 5 minutes and then proceed to full power, unless the source operates on a binary on/off switch in which case ramp-up is not required. Ramp-up and activation must be delayed if a marine mammal(s) enters its respective shutdown zone. Ramp-up and activation may only be reinitiated if the animal(s) has been observed exiting its respective shutdown zone or until 15 minutes for small odontocetes and pinnipeds, and 30 minutes for all other species, has elapsed with no further sightings; 6. The applicant must implement a 30-minute clearance period of the clearance zones immediately prior to the commencing of the survey or when there is more than a 30 minute break in survey activities or PSO monitoring. A clearance period is a period when no marine mammals are detected in the relevant zone; 7. If a marine mammal is observed within a clearance zone during the clearance period, ramp-up or acoustic surveys may not begin until the animal(s) has been observed voluntarily exiting its respective clearance zone or until a specific time period has elapsed with no further sighting. The specific time period is 15 minutes for small odontocetes and seals, and 30 minutes for all other species; 8. Any large whale sighted by a PSO within 1 kilometer of the SBP that cannot be identified by species must be treated as if it were a NARW and the applicant must apply the mitigation measure applicable to this species; 9. In any case when the clearance process has begun in conditions with good visibility, including via the use of night vision equipment (infrared/thermal camera), and the Lead PSO has determined that the clearance zones are clear of marine mammals, survey operations would be allowed to commence (i.e., no delay is required) despite periods of inclement weather and/or loss of daylight;	Marine mammals (3.7)	BOEM BSEE NMFS

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			10. Once the survey has commenced, the applicant must shut down SBPs if a marine mammal enters a respective shutdown zone, except in cases when the shutdown zones become obscured for brief periods due to inclement weather, survey operations would be allowed to continue (i.e., no shutdown is required) so long as no marine mammals have been detected. The shutdown requirement does not apply to small delphinids of the following genera: Delphinus, Stenella, Lagenorhynchus, and Tursiops. If there is uncertainty regarding the identification of a marine mammal species (i.e., whether the observed marine mammal belongs to one of the delphinid genera for which shutdown is waived), the PSOs must use their best professional judgment in making the decision to call for a shutdown. Shutdown is required if a delphinid that belongs to a genus other than those specified in this paragraph (e)(10) is detected in the shutdown zone; 11. If SBPs have been shut down due to the presence of a marine mammal, the use of SBPs may not commence or resume until the animal(s) has been confirmed to have left the Level B harassment zone or until a full 15 minutes (for small odontocetes and seals) or 30 minutes (for all other marine mammals) have elapsed with no further sighting; 12. The applicant must immediately shutdown any SBP acoustic source if a marine mammal is sighted entering or within its respective shutdown zones. If there is uncertainty regarding the identification of a marine mammal species (i.e., whether the observed marine mammal belongs to one of the delphinid genera for which shutdown is waived), the PSOs must use their best professional judgment in making the decision to call for a shutdown. Shutdown is required if a delphinid that belongs to a genus other than those specified in paragraph (f)(12) is detected in the shutdown zone; 13. If a SBP is shut down for reasons other than mitigation (e.g., mechanical difficulty) for less than 30 minutes, it would be allowed to be activated again without ramp-up only if: i. PSOs have maintained constant observation; and ii. (ii) No additional detections of any marine mammal occurred within the respective shutdown zones.		
154.	Construction	Fisheries monitoring survey measures	1. All captains and crew conducting fishery surveys must be trained in marine mammal detection and identification. Marine mammal monitoring will be conducted by the trained captain and/or a member of the scientific crew before (within 1 nautical mile and 15 minutes prior to deploying gear), during, and for 15 minutes after haul back; 2. Survey gear will be deployed as soon as possible once the vessel arrives on station; 3. The applicant and/or its cooperating institutions, contracted vessels, or commercially-hired captains must implement the following "move-on" rule: If marine mammals are sighted within 1 nautical mile of the planned location and 15 minutes before gear deployment, then the applicant and/or its cooperating institutions, contracted vessels, or commercially-hired captains, as appropriate, must move the vessel away from the marine mammal to a different section of the sampling area. If, after moving on, marine mammals are still visible from the vessel, the applicant and/or its cooperating institutions, contracted vessels, or commercially-hired captains must move again or skip the station; 4. If a marine mammal is deemed to be at risk of interaction after the gear is set, all gear must be immediately removed from the water. If marine mammals are sighted before the gear is fully removed from the water, the vessel will slow its speed and maneuver the vessel away from the animals to minimize potential interactions with the observed animal; 5. The applicant must maintain visual monitoring effort during the entire period of time that gear is in the water (i.e., throughout gear deployment, fishing, and retrieval); 6. All fisheries monitoring gear must be fully cleaned and repaired (if damaged) before each use; 7. The applicant's fixed gear must comply with the Atlantic Large Whale Take Reduction Plan regulations at 50 CFR 229.32 during fisheries monitoring surveys; 8. Trawl tows will be limited to a 20-minute trawl time at 3.0 knots; 9. All gear, trawl or otherwise, will be emptied immediately after retrieval within the vicinity of the deck; 10. During trawl surveys, vessel crew will open the codend of the trawl net close to the deck in order to avoid injury to animals that may be caught in the gear; 11. During any survey that uses vertical lines, buoy lines will be weighted and will not float at the surface of the water and all groundlines will consist of sinking line. All groundlines must be composed entirely of sinking line. Buoy lines must utilize weak links. Weak links must break cleanly leaving behind the bitter end of the line. The bitter end of the line must be free of any knots when the weak link breaks. Splices are not considered to be knots. The attachment of buoys, toggles, or other floatation devices to groundlines is prohibited; 12. All in-water survey gear will be properly labeled with the scientific permit number or identification as applicant-related research gear. All labels and markings on the buoys and buoy lines will also be compliant with the applicable regulations, and all buoy markings will comply with instructions received by the NOAA GARFO Protected Resources Division; and 13. All survey gear will be removed from the water whenever not in active survey use (i.e., no wet storage). All reasonable efforts, that do not compromise human safety, must be undertaken to recover gear. All lost gear must be reported to NOAA GARFO Protected Resources Division (nmfs.gar.incidental-take@noaa.gov) within 24 hours of the documented time of missing or lost gear. This report must include information on any markings on the gear and any efforts undertaken or planned to recover the gear.	Finfish, Invertebrates, Essential Fish Habitat (3.6), Marine mammals (3.7), Commercial Fisheries and For-Hire Recreational Fishing (3.9)	BOEM BSEE NMFS
155.	Construction	PSO and PAM operator qualifications	1. The applicant must use independent, dedicated, qualified PSOs and PAM operators, meaning that the PSOs and PAM operators must be employed by a third-party observer provider, must have no tasks other than to conduct observational effort, collect data, and communicate with and instruct relevant vessel crew with regard to the presence of protected species and mitigation requirements; 2. PSOs and PAM operators must have successfully attained a bachelor's degree from an accredited college or university with a major in one of the natural sciences, a minimum of 30 semester hours or equivalent in the biological sciences, and at least one undergraduate course in math or statistics. The educational requirements may be waived if the PSO or PAM operator has acquired the relevant skills through a suitable amount of alternate experience. Requests for such a waiver shall be submitted to NMFS OPR and must include written justification containing alternative experience. Alternate experience that may be considered includes, but is not limited to: previous work experience conducting academic, commercial, or government sponsored marine mammal visual and/or acoustic surveys; or previous work experience as a PSO/PAM operator; and the PSO/PAM operator should demonstrate good standing and consistently good performance of PSO/PAM duties;	Marine mammals (3.7)	BOEM BSEE NMFS

Measure Number	Project Stage[a]	Measure Title	Measure Description	Resource Area Addressed (EIS Section)	BOEM's Identification of the Anticipated Enforcing Agency[b]
			3. PSOs and PAM operators must successfully complete the required training within the last 5 years, including obtaining a certificate of course completion; 4. PSOs must have visual acuity in both eyes (with correction of vision being permissible) sufficient enough to discern moving targets on the water's surface with the ability to estimate the target size and distance (binocular use is allowable); ability to conduct field observations and collect data according to the assigned protocols; sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations; writing skills sufficient to document observations, including but not limited to, the number and species of marine mammals observed, the dates and times of when in-water construction activities were conducted, the dates and time when in-water construction activities were suspended to avoid potential incidental take of marine mammals from construction noise within a defined shutdown zone, and marine mammal behavior; and the ability to communicate orally, by radio, or in-person, with project personnel to provide real-time information on marine mammals observed in the area; 5. All PSOs and PAM operators must be approved by the NMFS OPR. The applicant must submit PSO resumes for NMFS OPR review and approval at least 90 days prior to commencement of in-water construction activities requiring PSOs and PAM operators. Resumes must include dates of training and any prior NMFS OPR approval, as well as dates and description of last experience, and must be accompanied by information documenting successful completion of an acceptable training course. NMFS OPR shall be allowed 3 weeks to approve PSOs from the time that the necessary information is received by NMFS OPR, after which PSOs meeting the minimum requirements will automatically be considered approved; 6. All PSOs must be trained in marine mammal identification and behaviors and must be able to conduct field observations and collect data according to assigned protocols. Additionally, PSOs must have the ability to work with all required and relevant software and equipment necessary during observations; 7. At least one PSO on active duty for each activity (i.e., foundation installation, UXO/MEC detonation activities, and HRG surveys) must be designated as the "Lead PSO". The Lead PSO must have a minimum of 90 days of at-sea experience working in an offshore environment and is required to have no more than 18 months elapsed since the conclusion of their last at-sea experience; 8. PAM operators must complete specialized training for operating PAM systems and must demonstrate familiarity with the PAM system on which they must be working; and 9. PSOs may work as PAM operators and vice versa, pending NMFS-approval; however, they may only perform one role at any one time and must not exceed work time restrictions, which will be tallied cumulatively.		
156.	Construction	General PSO and PAM operator requirements	1. PSOs must monitor for marine mammals prior to, during, and following pile driving, drilling, UXO/MEC detonation activities, and during HRG surveys that use sub-bottom profilers (with specific monitoring durations and needs described in paragraphs (c) through (e) of this section, respectively). 2. PAM operator(s) must acoustically monitor for marine mammals prior to, during, and following all pile driving, drilling, and UXO/MEC detonation activities. PAM operators may be located on a vessel or remotely on-shore but must have the appropriate equipment (i.e., computer station equipped with a data collection software system available wherever they are stationed) and be in real-time communication with PSOs and transiting vessel captains; 3. All PSOs must be located at the best vantage point(s) on any platform, in order to obtain 360 degree visual coverage of the entire clearance and shutdown zones around the activity area, and as much of the Level B harassment zone as possible; 4. All on-duty visual PSOs must remain in contact with the on-duty PAM operator, who would monitor the PAM systems for acoustic detections of marine mammals in the area, regarding any animal detection that might be approaching or found within the applicable zones no matter where the PAM operator is stationed (e.g., onshore or on a vessel); 5. During all visual observation periods during the Project, PSOs must use high magnification (25x) binoculars, standard handheld (7x) binoculars, and the naked eye to search continuously for marine mammals. During all pile driving and drilling, at least one PSO on the primary pile driving vessel must be equipped with functional Big Eye binoculars (e.g., 25 x 150; 2.7 view angle; individual ocular focus; height control); these must be pedestal mounted on the deck at the best vantage point that provides for optimal sea surface observation and PSO safety; 6. During all acoustic monitoring periods during the Project, PAM operators must use PAM systems as approved by NMFS; 7. During periods of low visibility (e.g., darkness, rain, fog, poor weather conditions, etc.), PSOs must use alternative technology (i.e., infrared or thermal cameras) to monitor the clearance and shutdown zones as approved by NMFS; 8. PSOs and PAM operators must not exceed 4 consecutive watch hours on duty at any time, must have a 2-hour (minimum) break between watches, and must not exceed a combined watch schedule of more than 12 hours in a 24-hour period; 9. Any PSO or PAM operator has the authority to call for a delay or shutdown of project activities; 10. PSOs must remain in real-time contact with the PAM operators and construction personnel responsible for implementing mitigation (e.g., delay to pile driving or UXO/MEC detonation) to ensure communication on marine mammal observations can easily, quickly, and consistently occur between all on-duty PSOs, PAM operator(s), and on-water Project personnel; and 11. The applicant is required to use available sources of information on NARW presence to aid in monitoring efforts. These include daily monitoring of the Right Whale Sightings Advisory System, consulting of the WhaleAlert app, and monitoring of the Coast Guard's VHF Channel 16 throughout the day to receive notifications of any sightings and information associated with any DMAs, to plan construction activities and vessel routes, if practicable, to minimize the potential for co-occurrence with NARWs.	Marine mammals (3.7)	BOEM BSEE NMFS
157.	Construction	PSO and PAM operator requirements during WTG and ESP	1. If PSOs cannot visually monitor the minimum visibility zone at all times using the equipment described in paragraphs (b)(3) and (4) of this section, pile driving operations must not commence or must shutdown if they are currently active; 2. All PSOs must begin monitoring 60 minutes prior to pile driving, during, and for 30 minutes after the activity. Pile driving must only commence when the minimum visibility zone is fully visible (e.g., not obscured by darkness, rain, fog, etc.) and the clearance zones are clear of marine mammals for at least 30 minutes, as determined by	Marine mammals (3.7)	BOEM BSEE NMFS

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		foundation installation	the Lead PSO, immediately prior to the initiation of pile driving. PAM operators must assist the visual PSOs in monitoring by conducting PAM activities 60 minutes prior to any pile driving, during, and after for 30 minutes for the appropriate size PAM clearance zone (dependent on season). The entire minimum visibility zone must be clear for at least 30 minutes, with no marine mammal detections within the visual or PAM clearance zones prior to the start of pile driving; 3. The applicant must conduct PAM for at least 24 hours immediately prior to pile driving activities; 4. During use of any real-time PAM system, at least one PAM operator must be designated to monitor each system by viewing data or data products that would be streamed in real-time or in near real-time to a computer workstation and monitor; 5. The PAM operator must inform the Lead PSO(s) on duty of animal detections approaching or within applicable ranges of interest to the pile driving activity via the data collection software system (i.e., Mysticetus or similar system) who will be responsible for requesting that the designated crewmember implement the necessary mitigation procedures (i.e., delay or shutdown); and 6. The applicant must prepare and submit a Marine Mammal Monitoring Plan to NMFS OPR for review and approval at least 180 days before the start of any pile driving. The plan must include final pile driving project design (e.g., number and type of piles, hammer type, NASs, anticipated start date, etc.) and all information related to PAM and PSO monitoring protocols for foundation installation activities.		
158.	Construction	PSO requirements during UXO/MEC detonations	1. All on-duty visual PSOs must remain in contact with the on-duty PAM operator, who would monitor the PAM systems for acoustic detections of marine mammals in the area, regarding any animal detection that might be approaching or found within the applicable zones no matter where the PAM operator is stationed (e.g., onshore or on a vessel); 2. If PSOs cannot visually monitor the minimum visibility zone at all times using the equipment described in paragraphs (b)(3) and (4) of this section; UXO/MEC operations must not commence or must shutdown if they are currently active; 3. All PSOs must begin monitoring 60 minutes prior to UXO/MEC detonation, during, and for 30 minutes after the activity. UXO/MEC detonation must only commence when the minimum visibility zone is fully visible (e.g., not obscured by darkness, rain, fog, etc.) and the clearance zones are clear of marine mammals for at least 30 minutes, as determined by the Lead PSO, immediately prior to the initiation of detonation. PAM operators must assist the visual PSOs in monitoring by conducting PAM activities 60 minutes prior to any UXO/MEC detonation, during, and after for 30 minutes for the appropriate size PAM clearance zone. The entire minimum visibility zone must be clear for at least 30 minutes, with no marine mammal detections within the visual or PAM clearance zones prior to the initiation of detonation; 4. For NARWs, any visual or acoustic detection must trigger a delay to the commencement of UXO/MEC detonation. In the event that a large whale is sighted or acoustically detected that cannot be confirmed by species, it must be treated as if it were a NARW; 5. The applicant must conduct PAM for at least 24 hours immediately prior to foundation installation and UXO/MEC detonation activities; 6. During use of any real-time PAM system, at least one PAM operator must be designated to monitor each system by viewing data or data products that would be streamed in real-time or in near real-time to a computer workstation and monitor; 7. The applicant must use a minimum of one PAM operator to actively monitor for marine mammals before, during, and after UXO/MEC detonation. The PAM operator must assist visual PSOs in ensuring full coverage of the clearance and shutdown zones. The PAM operator must inform the Lead PSO(s) on duty of animal detections approaching or within applicable ranges of interest to the activity occurring via the data collection software system (i.e., Mysticetus or similar system) who will be responsible for requesting that the designated crewmember implement the necessary mitigation procedures (i.e., delay or shutdown); 8. PAM operators must be on watch for a maximum of 4 consecutive hours, followed by a break of at least 2 hours between watches, and may not exceed a combined watch schedule of more than 12 hours in a single 24-hour period; 9. The applicant must prepare and submit a Marine Mammal Monitoring Plan to NMFS OPR for review and approval at least 180 days before the start of any detonation. The plan must include final UXO/MEC detonation project design (e.g., number and type of UXO/MECs, removal method(s), charge weight(s), anticipated start date, etc.) and all information related to PAM and PSO monitoring protocols for UXO/MEC activities; and 10. A PAM Plan must be submitted to NMFS OPR for review and approval at least 180 days prior to the planned start of foundation installation and prior to the start of any UXO/MEC detonation(s). The authorization to take marine mammals would be contingent upon NMFS OPR approval of the PAM Plan.	Marine mammals (3.7)	BOEM BSEE NMFS
159.	Construction	PSO requirements during HRG surveys	1. Between four and six PSOs must be present on every 24-hour survey vessel and two to three PSOs must be present on every 12-hour survey vessel; 2. At least one PSO must be on active duty monitoring during HRG surveys conducted during daylight (i.e., from 30 minutes prior to civil sunrise through 30 minutes following civil sunset) and at least two PSOs must be on activity duty monitoring during HRG surveys conducted at night; 3. PSOs on HRG vessels must begin monitoring 30 minutes prior to activating SBPs during the use of these acoustic sources, and for 30 minutes after use of these acoustic sources has ceased; 4. During daylight hours when survey equipment is not operating, the applicant must ensure that visual PSOs conduct, as rotation schedules allow, observations for comparison of sighting rates and behavior with and without use of the specified acoustic sources. Off-effort PSO monitoring must be reflected in the monthly PSO monitoring reports; and 5. Any acoustic monitoring would complement visual monitoring efforts and would cover an area of at least the Level B harassment zone around each acoustic source.	Marine mammals (3.7)	BOEM BSEE NMFS
160.	Construction	Reporting	1. Prior to initiation of in-water project activities, the applicant must demonstrate in a report submitted to NMFS OPR that all required training for the applicant's personnel (including the vessel crews, vessel captains, PSOs, and PAM operators) has been completed; 2. The applicant must use a standardized reporting system during the effective period of the LOA. All data collected related to the Project must be recorded using industry-standard software that is installed on field laptops and/or tablets.	Marine mammals (3.7)	BOEM BSEE NMFS

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			3. For all monitoring efforts and marine mammal sightings, the following information must be collected and reported: i. Date and time that monitored activity begins or ends; Construction activities occurring during each observation period; Watch status (i.e., sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform); PSO who sighted the animal; Time of sighting; Weather parameters (e.g., wind speed, percent cloud cover, visibility); Water conditions (e.g., Beaufort sea state, tide state, water depth); All marine mammal sightings, regardless of distance from the construction activity; Species (or lowest possible taxonomic level possible); Pace of the animal(s); Estimated number of animals (minimum/maximum/high/low/best); Estimated number of animals by cohort (e.g., adults, yearlings, juveniles, calves, group composition, etc.); Description (i.e., as many distinguishing features as possible of each individual seen, including length, shape, color, pattern, scars or markings, shape and size of dorsal fin, shape of head, and blow characteristics); Description of any marine mammal behavioral observations (e.g., observed behaviors such as feeding or traveling) and observed changes in behavior, including an assessment of behavioral responses thought to have resulted from the specific activity; Animal's closest distance and bearing from the pile being driven or specified HRG equipment and estimated time entered or spent within the Level A harassment and/or Level B harassment zone(s); Activity at time of sighting (e.g., vibratory installation/removal, impact pile driving, construction survey), use of any noise attenuation device(s), and specific phase of activity (e.g., ramp-up of HRG equipment, HRG acoustic source on/off, soft-start for pile driving, active pile driving, etc.); Marine mammal occurrence in Level A harassment or Level B harassment zones; Description of any mitigation-related action implemented, or mitigation-related actions called for but not implemented, in response to the sighting (e.g., delay, shutdown, etc.) and time and location of the action; and other human activity in the area. 4. If a marine mammal is acoustically detected during PAM monitoring, the following information must be recorded and reported to NMFS OPR: i. Location of hydrophone (latitude & longitude; in Decimal Degrees) and site name; Bottom depth and depth of recording unit (in meters); Recorder (model & manufacturer) and platform type (i.e., bottom-mounted, electric glider, etc.), and instrument ID of the hydrophone and recording platform (if applicable); Time zone for sound files and recorded date/times in data and metadata (in relation to UTC; i.e., Eastern Standard Time time zone is UTC–5); Duration of recordings (start/end dates and times; in ISO 8601 format, yyyy-mm-ddTHH:MM:SS.sssZ); Deployment/retrieval dates and times (in ISO 8601 format); Recording schedule (must be continuous); Hydrophone and recorder sensitivity (in dB re 1 microPascal); Calibration curve for each recorder; Bandwidth/sampling rate (in Hz); Sample bit-rate of recordings; and Detection range of equipment for relevant frequency bands (in meters). 5. Information required for each detection, the following information must be noted: i. Species identification (if possible); Call type and number of calls (if known); Temporal aspects of vocalization (date, time, duration, etc.; date times in ISO 8601 format); Confidence of detection (detected, or possibly detected); Comparison with any concurrent visual sightings; Location and/or directionality of call (if determined) relative to acoustic recorder or construction activities; Location of recorder and construction activities at time of call; Name and version of detection or sound analysis software used, with protocol reference; Minimum and maximum frequencies viewed/monitored/used in detection (in Hz); and Name of PAM operator(s) on duty. 6. The applicant must compile and submit weekly reports to NMFS OPR that document the daily start and stop of all pile driving, UXO/MEC detonations, and HRG survey associated with the Project; the start and stop of associated observation periods by PSOs; details on the deployment of PSOs; a record of all detections of marine mammals (acoustic and visual); any mitigation actions (or if mitigation actions could not be taken, provide reasons why); and details on the NAS(s) used and its performance. Weekly reports are due on Wednesday for the previous week (Sunday–Saturday) and must include the information required under this section. The weekly report must also identify which turbines become operational and when (a map must be provided). This weekly report must also identify when, what charge weight size, and where UXO/MECs are detonated (a map must also be provided). Once all foundation pile installation and UXO/MEC detonations are completed, weekly reports are no longer required by the applicant; 7. The applicant must compile and submit monthly reports to NMFS OPR that include a summary of all information in the weekly reports, including project activities carried out in the previous month, vessel transits (number, type of vessel, and route), number of piles installed, all detections of marine mammals, and any mitigative action taken. Monthly reports are due on the 15th of the month for the previous month. The monthly report must also identify which turbines become operational and when (a map must be provided). This weekly report must also identify when, what charge weight size, and where UXO/MECs are detonated (a map must also be provided). Once foundation installation and UXO/MEC detonations are completed, monthly reports are no longer required; 8. The applicant must submit a draft annual report to NMFS OPR no later than 90 days following the end of a given calendar year. The applicant must provide a final report within 30 days following resolution of comments on the draft report. The draft and final reports must detail the following information: i. The total number of marine mammals of each species/stock detected and how many were within the designated Level A harassment and Level B harassment zone(s) with comparison to authorized take of marine mammals for the associated activity type; Marine mammal detections and behavioral observations before, during, and after each activity; What mitigation measures were implemented (i.e., number of shutdowns or clearance zone delays, etc.) or, if no mitigative actions was taken, why not; Operational details (i.e., days and duration of impact and vibratory pile driving, days and duration of drilling, days and number of UXO/MEC detonations, days and amount of HRG survey effort, etc.); Any PAM systems used; The results, effectiveness, and which NASs were used during relevant activities (i.e., impact and vibratory pile driving, drilling, and UXO/MEC detonations); Summarized information related to situational reporting; Any other important information relevant to the Project, including additional information that may be identified through the adaptive management process; and ii. The final annual report must be prepared and submitted within 30 calendar days following the receipt of any comments from NMFS OPR on the draft report. If no comments are received from NMFS OPR within 60 calendar days of NMFS OPR' receipt of the draft report, the report must be considered final. 9. The applicant must submit its draft 5-year report to NMFS OPR on all visual and acoustic monitoring conducted within 90 calendar days of the completion of activities occurring under the LOA. A 5-year report must be prepared and submitted within 60 calendar days following receipt of any NMFS OPR comments on the draft report. If no comments are received from NMFS OPR within 60 calendar days of NMFS OPR receipt of the draft report, the report shall be considered final; 10. The applicant must submit a SFV plan at least 180 days prior to the planned start of vibratory and impact pile driving, drilling, and UXO/MEC detonations. At minimum, the plan must describe how the applicant would ensure that the first three monopile and two jacket (using pin piles) foundation installation sites selected for SFV are		

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			representative of the rest of the monopile and pin pile installation sites. In the case that these sites/scenarios are not determined to be representative of all other monopile/pin pile installation sites, the applicant must include information on how additional sites/scenarios would be selected for SFV. The plan must also include methodology for collecting, analyzing, and preparing SFV data for submission to NMFS OPR. The plan must describe how the effectiveness of the sound attenuation methodology would be evaluated based on the results. The applicant must also provide, as soon as they are available but no later than 48 hours after each installation, the initial results of the SFV measurements to NMFS OPR in an interim report after each monopile for the first three piles, after two jacket foundation using pin piles are installed, and after each UXO/MEC detonation; and i. The SFV plan must also include how operational noise would be monitored. These data must be used to identify estimated transmission loss rates. Operational parameters (e.g., direct drive/gearbox information, turbine rotation rate), characteristics about the UXO/MEC (e.g., charge weight, size, type of charge), as well as sea state conditions and information on nearby anthropogenic activities (e.g., vessels transiting or operating in the area) must be reported; ii. The applicant must provide the initial results of the SFV measurements to NMFS OPR in an interim report after each foundation installation for the first three monopile foundation piles and two jacket foundations (all pin piles), and for each UXO/MEC detonated, as soon as they are available, but no later than 48 hours after each completed installation event and/or detonation. The applicant must also provide interim reports on any subsequent SFV on foundation piles within 48 hours. The interim pile driving SFV report must include hammer energies used during pile driving, SPLpk and median, mean, maximum, and minimum root-mean-square sound pressure level that contains 90 percent of the acoustic energy (SPLrms) and SELss; and iii. The final results of SFV of foundation installations and UXO/MEC detonations must be submitted as soon as possible, but no later than within 90 days following completion of all foundation installation of monopiles and jackets (pin piles) and all necessary detonation events. The final report must include, at minimum, the following: A. SPLpk, root-mean-square sound pressure level that contains 90 percent of the acoustic energy (SPLrms), SELss, integration time for SPLrms, spectrum, and 24-hour cumulative SEL extrapolated from measurements at specified distances (e.g., 750 meters) in mean, median, maximum and minimum levels; B. The SEL and SPL power spectral density and one-third octave band levels (usually calculated as decidecade band levels) at the receiver locations should be reported; The sound levels reported must be in median and linear average (i.e., average in linear space), and in dB; C. Local environmental conditions, such as wind speed, transmission loss data collected on-site (or the sound velocity profile), baseline pre- and post-activity ambient sound levels (broadband and/or within frequencies of concern); A description of depth and sediment type, as documented in the COP, at the recording and foundation installation and UXO/MEC detonation locations; D. The extents of the Level A harassment and Level B harassment zone(s); Hammer energies required for pile installation and the number of strikes per pile; and Charge weights and other relevant characteristics of UXO/MEC detonations; E. Hydrophone equipment and methods (i.e., recording device, bandwidth/sampling rate, distance from the monopile/pin pile and/or UXO/MEC where recordings were made; depth of recording device(s)); Description of the SFV PAM hardware and software, including software version used, calibration data, bandwidth capability and sensitivity of hydrophone(s), any filters used in hardware or software, any limitations with the equipment, and other relevant information; and F. Spatial configuration of the noise attenuation device(s) relative to the pile and/or UXO/MEC charge; A description of the NAS and operational parameters (e.g., bubble flow rate, distance deployed from the pile and/or UXO/MEC, etc.) and any action taken to adjust the NAS. 11. The applicant must submit situational reports if the following circumstances occur: i. If a NARW is observed at any time by PSOs or personnel on or in the vicinity of any project vessel, or during vessel transit, the applicant must immediately report sighting information to the NMFS North Atlantic Right Whale Sighting Advisory System (866) 755–6622, through the WhaleAlert app (https://www.whalealert.org/), and to the USCG via channel 16, as soon as feasible but no later than 24 hours after the sighting. Information reported must include, at a minimum: time of sighting, location, and number of NARWs observed; ii. When an observation of a large whale occurs during vessel transit, the following information must be recorded and reported to NMFS OPR: iii. Time, date, and location (latitude/longitude; in Decimal Degrees); The vessel's activity, heading, and speed; Beaufort sea state, water depth (meters), and visibility; Marine mammal identification to the best of the observer's ability (e.g., NARW, whale, dolphin, seal); Initial distance and bearing to marine mammal from vessel and closest point of approach; and Any avoidance measures taken in response to the marine mammal sighting. iv. If a NARW is detected via PAM, the date, time, location (i.e., latitude and longitude of recorder) of the detection as well as the recording platform that had the detection must be reported to nmfs.pacmdata@noaa.gov as soon as feasible, but no longer than 24 hours after the detection. Full detection data and metadata must be submitted monthly on the 15th of every month for the previous month via the webform on the NMFS North Atlantic Right Whale Passive Acoustic Reporting System website at https://www.fisheries.noaa.gov/resource/document/passive-acoustic-reporting-system-templates; v. In the event that the personnel involved in the Project discover a stranded, entangled, injured, or dead marine mammal, the applicant must immediately report the observation to the NMFS OPR, the NMFS Greater Atlantic Stranding Coordinator for the New England/Mid-Atlantic area (866–755–6622), and the USCG within 24 hours. If the injury or death was caused by a project activity, the applicant must immediately cease all activities until NMFS OPR is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of the LOA. NMFS OPR may impose additional measures to minimize the likelihood of further prohibited take and ensure MMPA compliance. The applicant may not resume their activities until notified by NMFS OPR. The report must include the following information: A. (A) Time, date, and location (latitude/longitude; in Decimal Degrees) of the first discovery (and updated location information if known and applicable); Species identification (if known) or description of the animal(s) involved; Condition of the animal(s) (including carcass condition if the animal is dead); Observed		

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			behaviors of the animal(s), if alive; If available, photographs or video footage of the animal(s); and General circumstances under which the animal was discovered.		

AIS = automatic identification system; applicant = Park City Wind LLC; ASR = airport surveillance radar; BO = Biological Opinion; BOEM = Bureau of Ocean Energy Management; BSEE = Bureau of Safety and Environmental Enforcement; CFR = Code of Federal Regulations; COP = Construction and Operations Plan; CR = Conservation Recommendation; CZM = Office of Coastal Zone Management; dB = decibel; DMA = dynamic management area; DTS = distributed temperature sensing; EFH = essential fish habitat; EIS = environmental impact statement; EMF = electromagnetic fields; ESA = Endangered Species Act; ESP = electrical service platform; FL = Florida; GARFO = Greater Atlantic Regional Fisheries Office; HAPC = habitat area of particular concern; HDD = horizontal directional drilling; HESD = Habitat and Ecosystem Services Division; HH:MM = hour:minute; HRG = high-resolution geophysical; Hz = hertz; ID = identification; ISO = International Organization for Standardization; ITA = Incidental Take Authorization; ITS = Incidental Take Statement; kHz = kilohertz; kJ = kilojoule; LOA = Letter of Authorization; MassDEP = Massachusetts Department of Environmental Protection; ME = Maine; MEC = munitions and explosives of concern; MMPA = Marine Mammal Protection Act; NA = not applicable; NARW = North Atlantic right whale; NAS = noise attenuation system; NC = North Carolina; NEFOP = Northeast Fisheries Observer Program; 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; OPR = Office of Protected Resources; PAM = passive acoustic monitoring; PATON = private aid to navigation; PSO = protected species observer; RPM = Reasonable and Prudent Measure; SAR = search and rescue; SAV = submerged aquatic vegetation; SBP = subbottom profiler; SEL = sound exposure level; SELss = single strike sound exposure level; SFV = sound field verification; SMA = seasonal management area; SPL = sound pressure level; SPLpk = peak sound pressure level; SPLrms = root-mean-square sound pressure level; SWDA = Southern Wind Development Area; TSHD = trailing suction hopper dredge; USACE = U.S. Army Corps of Engineers; USCG = U.S. Coast Guard; USFWS = U.S. Fish and Wildlife Service; UTC = Universal Time Coordinated; UXO = unexploded ordnance; VA = Virginia; VHF = very high frequency; 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 via TIMSWeb.

[c] NMFS issued CRs to BOEM and USACE for the proposed Project via letter on October 20, 2023. As required by section 305(b)(4)(B) of the Magnuson-Stevens Act, USACE and BOEM will provide a detailed response to these CRs to NMFS regarding which measures will be adopted, partially adopted, or not adopted along with a rationale. At the time of Final EIS issuance, BOEM and USACE have yet not determined which CRs each agency intends to adopt or partially adopt. As such, the full list of CRs received from NMFS is included in this document.

[d] The mitigation, monitoring, and reporting measures from the MMPA proposed rule listed here may be different from those listed in NMFS' final rule, once issued.

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H.1 References

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Appendix I
Seascape, Landscape, and Visual Impact Assessment

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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.

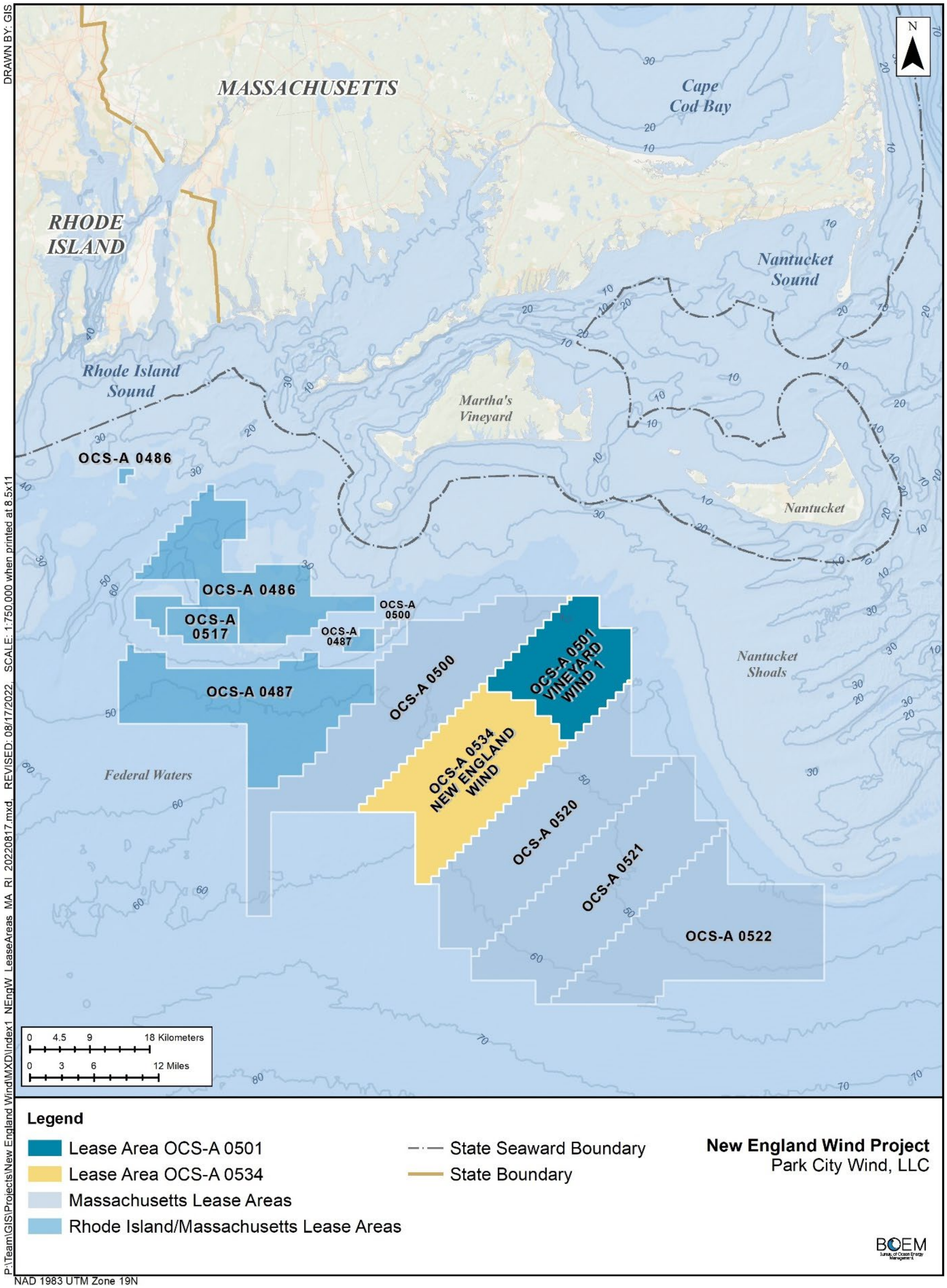


Figure I-1: Location of Offshore Wind Energy Projects in the Rhode Island and Massachusetts Lease Areas

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:

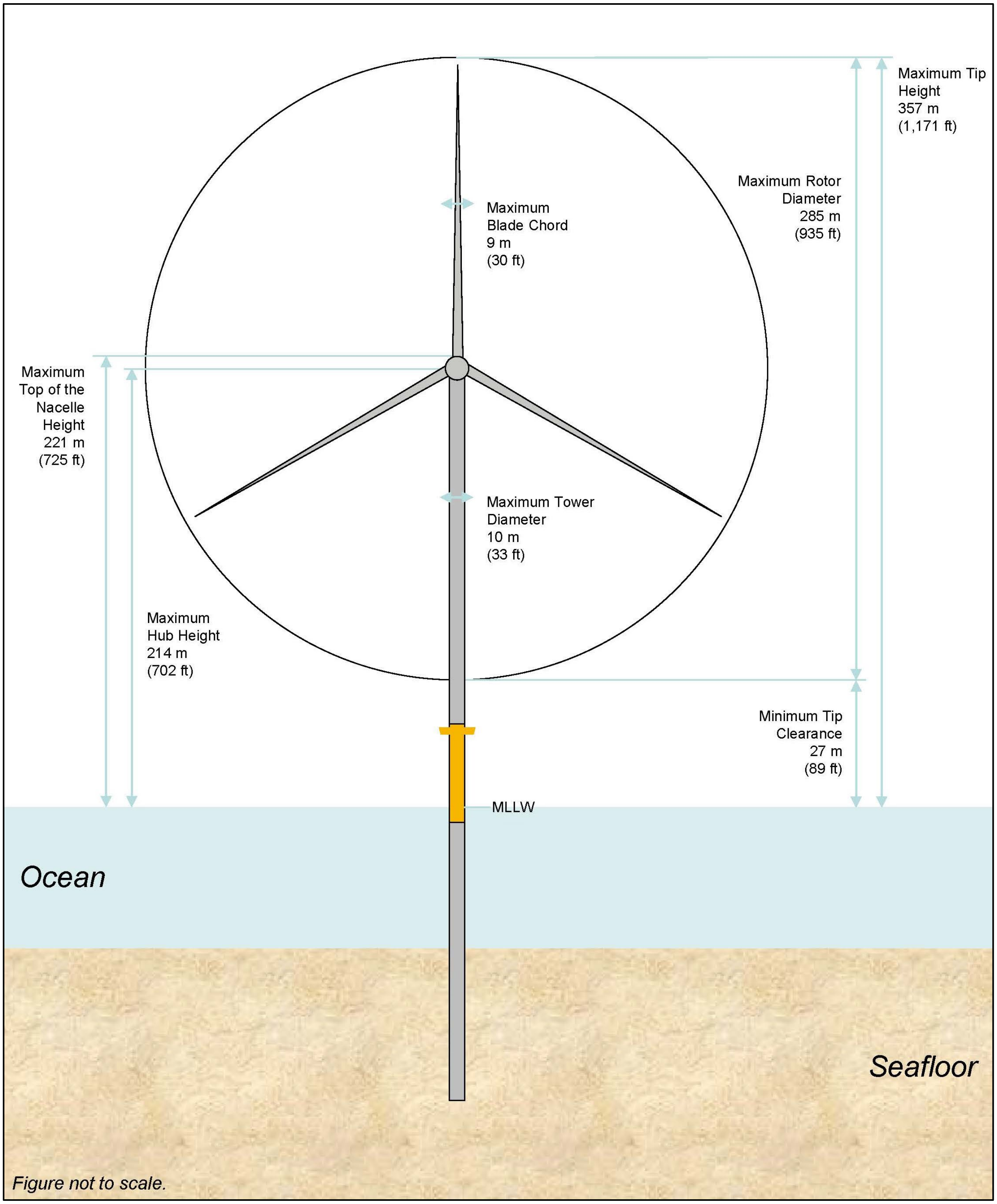
- Martha's Vineyard (Squibnocket Point), closest WTG: 21.3 miles;
- Martha's Vineyard (Squibnocket Point), farthest WTG: 38.3 miles;
- Nantucket (Madaket Beach), closest WTG: 25.2 miles; and
- Nantucket (Madaket Beach), farthest WTG: 45.4 miles.

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

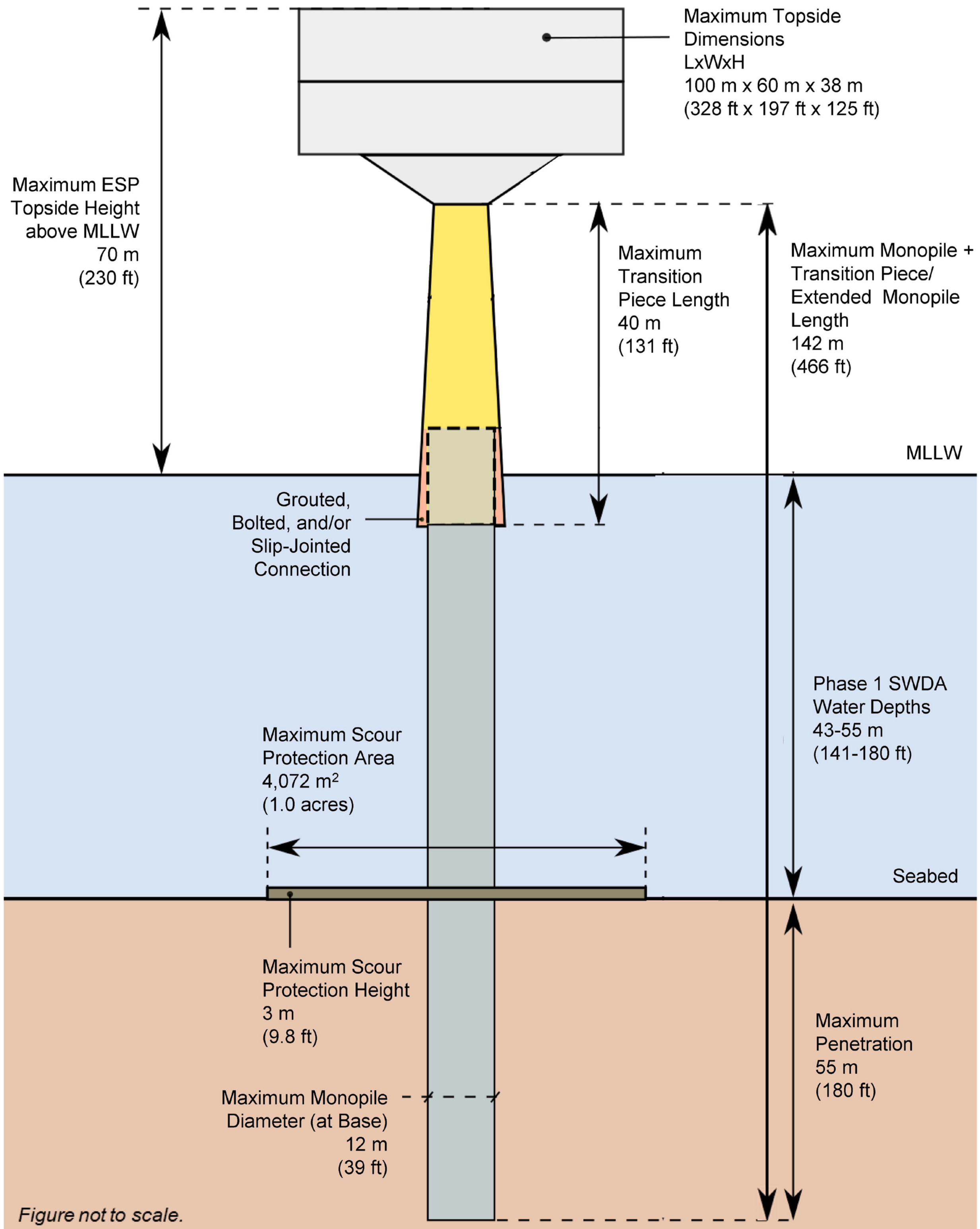
The SLVIA has two separate but linked parts: the seascape and landscape impact assessment (SLIA) and the visual impact assessment (VIA), as described in detail in BOEM's SLVIA guidance (Sullivan 2021). SLIA analyzes and evaluates impacts on both the physical elements and features that make up a landscape, 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 2023
ft = feet; m = meter; MLLW = mean lower low water

Figure I-2: Proposed Project Maximum Wind Turbine Generator Size

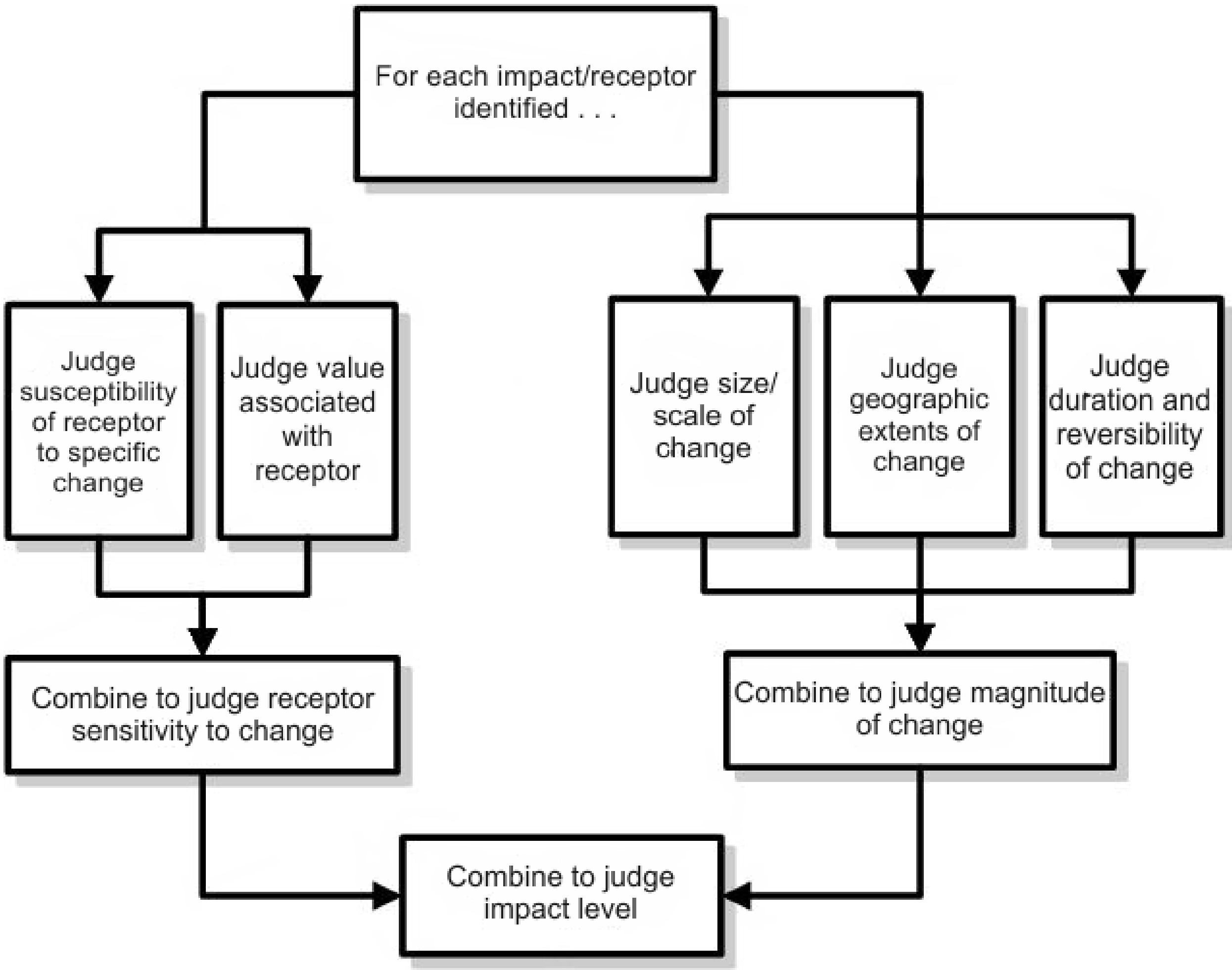


Source: COP Volume I, Figure 3.2-6; Epsilon 2023
ESP = electrical service platform; ft = feet; m = meter; m^2 = square meters; MLLW = mean lower low water; SWDA = Southern Wind Development Area; W×L×H = width × length × height

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. 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. 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. 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. 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 2023). 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 2023). The COP (Appendix III-H.a; Epsilon 2023) 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 2023). 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 2023).

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 2023).

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 2023).

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 2023).[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

Units	**Description**
Seascape Units	
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. 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. 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. 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 United States). 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. 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).

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.

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. 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. 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 2023

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 2023) 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 2023). 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 2023

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 2023). 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 2023). 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 2023).

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 2023).

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 2023) 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 2023). 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 2023). 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 2023) 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 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 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 There is importance placed on beachfronts by residents and visitors, as well as the presence of multiple special designation areas.	Large There is a large, linear area within this unit with unobstructed views of the proposed Project area.	Medium 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 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** 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 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 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 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 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 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 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** 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 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 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 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 There is a large area within this unit with unscreened views of the proposed Project.	Large The proposed Project would add an obvious human-made element to otherwise undisturbed natural-appearing views.	Large 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** The Open Ocean Unit is highly sensitive, and the proposed Project would be clearly noticeable over a large area.
Coastal Dunes	Low 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 Coastal dunes are often strictly regulated ecological communities, valued for their biological function more so than their landscape character.	Low 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 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 The proposed Project would be a minimal change to landscape and views.	Medium 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** 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.

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**
Salt Pond/Tidal Marsh	Low 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 scrub vegetation. Residences and associated docks and boats are often present along the edges of ponds, many with associated docks and boats.	Medium 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 This setting is valued for its uses and localized views, including views of the open ocean.	Moderate This unit has moderate geographic extent. Salt ponds/tidal marshes are found as interstitial spaces between other units.	Medium 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 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 proposed Project would be easily discernable in seaward views.	**Moderate** 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.
Coastal Scrub Brush	Low 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 Viewer activity is primarily local travel and recreational trail use, where landscape character is a component of the overall value.	Low Views are constrained within immediate area with most ocean views obscured by vegetation.	Small A small geographic extent of this unit is relegated to specific conditions found as an interstitial space between other, more abundant units.	Small The proposed Project would be a minimal change to landscape and views.	Small 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** 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 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 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 Views are constrained to the immediate area with ocean views obscured by vegetation.	Small 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 The proposed Project would be a minimal change to landscape and views.	Small Restricted views available along narrow corridors limit discernibility of proposed Project size, WTG scale, and geographic extent.	**Negligible** The Forest Unit provides very limited options for views toward the ocean and the proposed Project.
Shoreline Residential	Medium 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 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 There are visually sensitive areas where open ocean views are integral components of character.	Large There is a large, linear area within this unit with unobstructed views of the Project area.	Medium 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 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** 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 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 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 While landscape character is highly valued, this unit offers few ocean views.	Small 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 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 Restricted views along narrow corridors would limit discernibility of proposed Project size, WTG scale, and geographic extent.	**Negligible** The Village/Town Center Unit provides limited ocean views and has limited susceptibility to changes in the seascape.
Rural Residential	Medium 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 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 The views are constrained within the immediate area, with ocean views obscured by vegetation.	Small There is a limited geographic extent due to the unit's inland location.	Small The proposed Project would be a minimal change to landscape.	Small 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** 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.

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**
Suburban Residential	Low 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 The primary value is the area's residential function, with attention focused inward (i.e., to individual homes and properties).	Low There are localized views and influence of built residential environment.	Small There is a small visual geographic extent relegated to specific inland conditions.	Small The proposed Project would be a minimal change to landscape and views.	Small Restricted views available along narrow corridors would limit discernibility of proposed Project size, WTG scale, and geographic extent.	**Negligible** 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.
Agricultural/Open Field	Low 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 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 Although highly valued, the unit's setting is not typically influenced by views of the ocean; instead, pastoral and agricultural character dominates.	Small 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 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 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** 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 (33 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 2023). 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 2023):

- **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

KOP	User Groups	Receptor Sensitivity			Impact Magnitude			
		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 (33 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, resulting in overall major impacts.

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
SouthCoast 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 SouthCoast 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 There is a large linear area within this unit with unobstructed views of the proposed Project area.	Large 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 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 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 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 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 There is a large area within this unit with unscreened views of the proposed Project.	Large The other offshore wind projects would add extensive and obvious human-made elements to otherwise undisturbed natural-appearing views.	Large 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 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 The other offshore wind projects would be a minimal change to landscape and views.	Large 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 This unit has a moderate geographic extent. Salt ponds/tidal marshes are found as interstitial spaces between other units.	Medium 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 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 This unit has a small geographic extent relegated to specific conditions found as an interstitial space between other, more abundant units.	Small The other offshore wind projects would be a minimal change to landscape and views.	Medium 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 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 The other offshore wind projects would be a minimal change to landscape and views.	Small 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 There is a large linear area within this unit with unobstructed views of the proposed Project area.	Large 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 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 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 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 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 There is a limited geographic extent due to the unit's inland location.	Small The other offshore wind projects would be a minimal change to landscape.	Small 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 There is a small visual geographic extent relegated to specific inland conditions.	Small The other offshore wind projects would be a minimal change to landscape and views.	Small 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 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 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 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 2023).
[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 WTG from one of the other offshore wind projects.
[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 2023). 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	Minor
8. Tom Nevers Field	Minor	Moderate	Moderate
21. Peaked Hill Reservation	Minor	Moderate	Moderate
22. Representative Offshore View[d]	Major	Major	Major
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 2023). 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

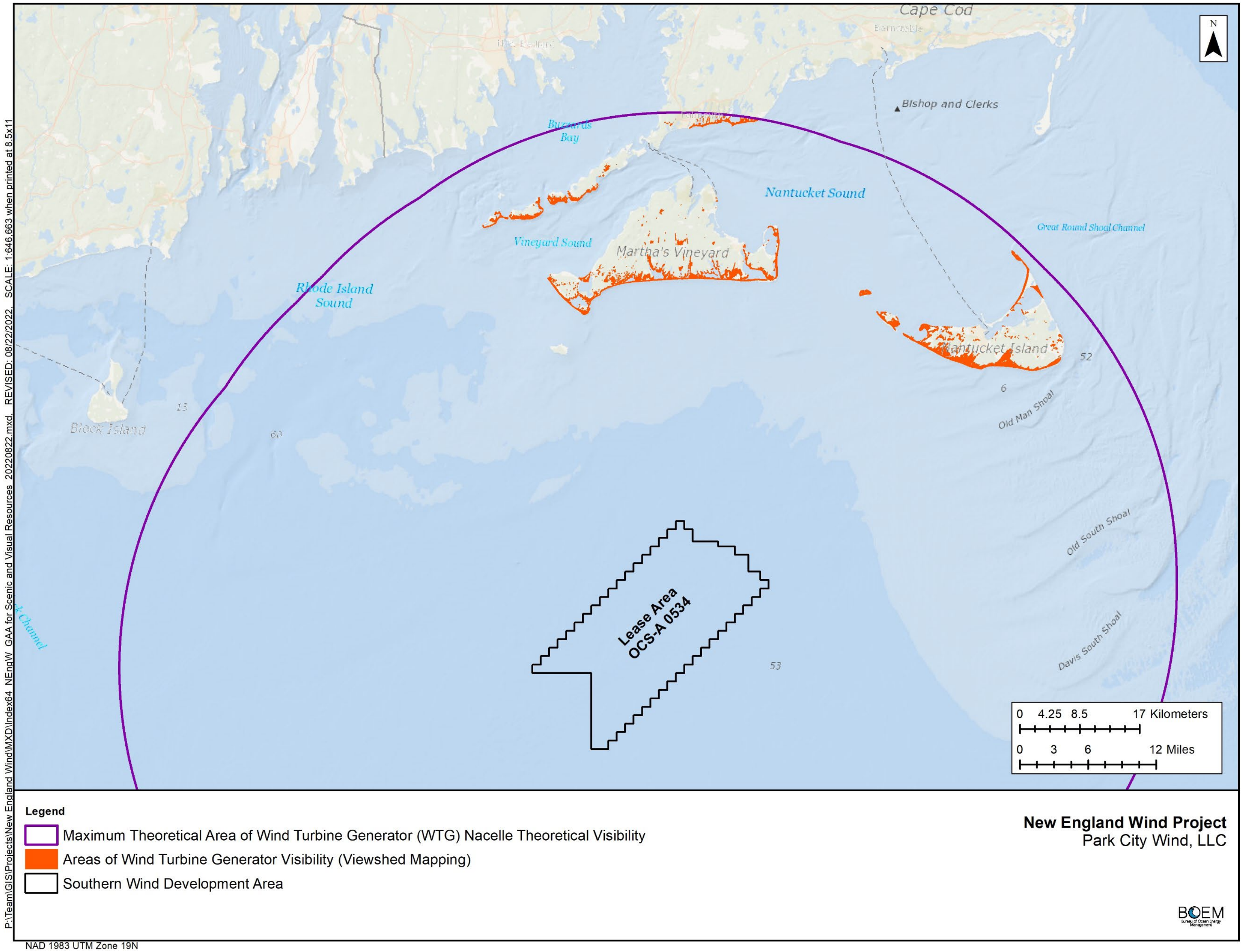


Figure I-1-1: Areas with Theoretical Visibility of Proposed Project Wind Turbine Generator Blades

ATTACHMENT I-2: APPLICANT-PREPARED SIMULATIONS

See COP Appendix III-H.a (Epsilon 2023)

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

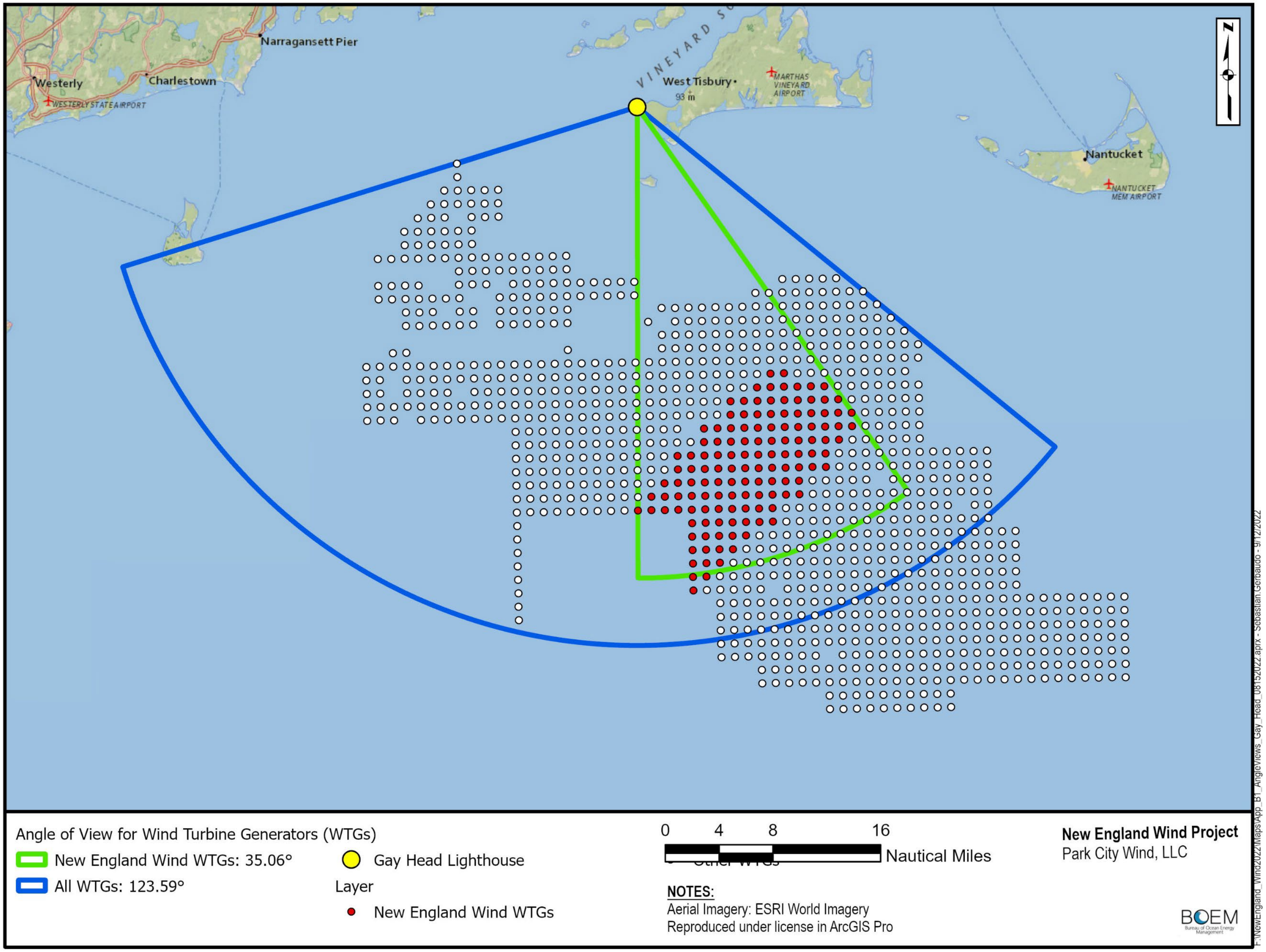


Figure I-3-1: Angle of Views to Turbines Theoretically Visible from Gay Head Lighthouse

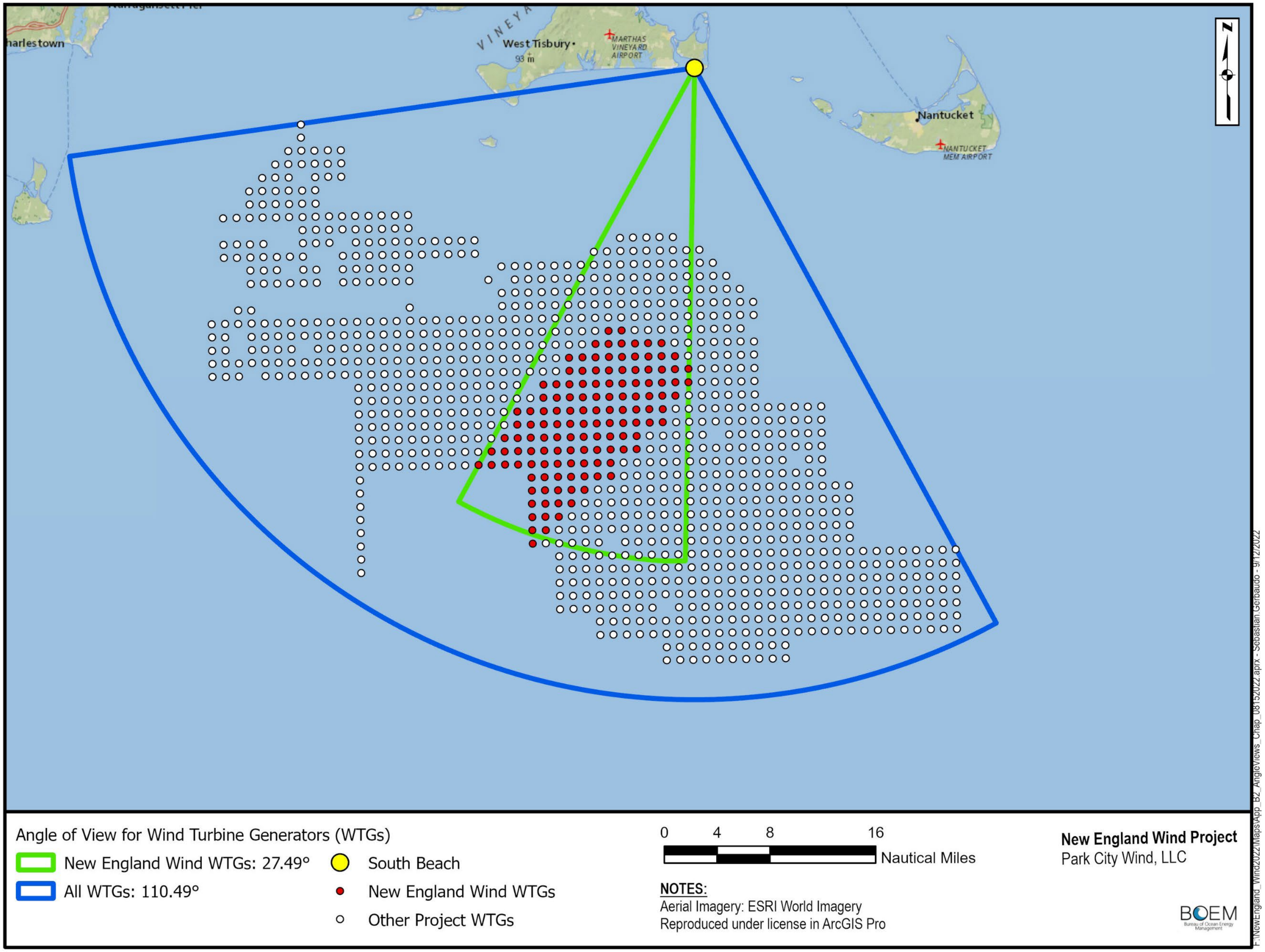


Figure I-3-2: Angle of Views to Turbines Theoretically Visible to South Beach

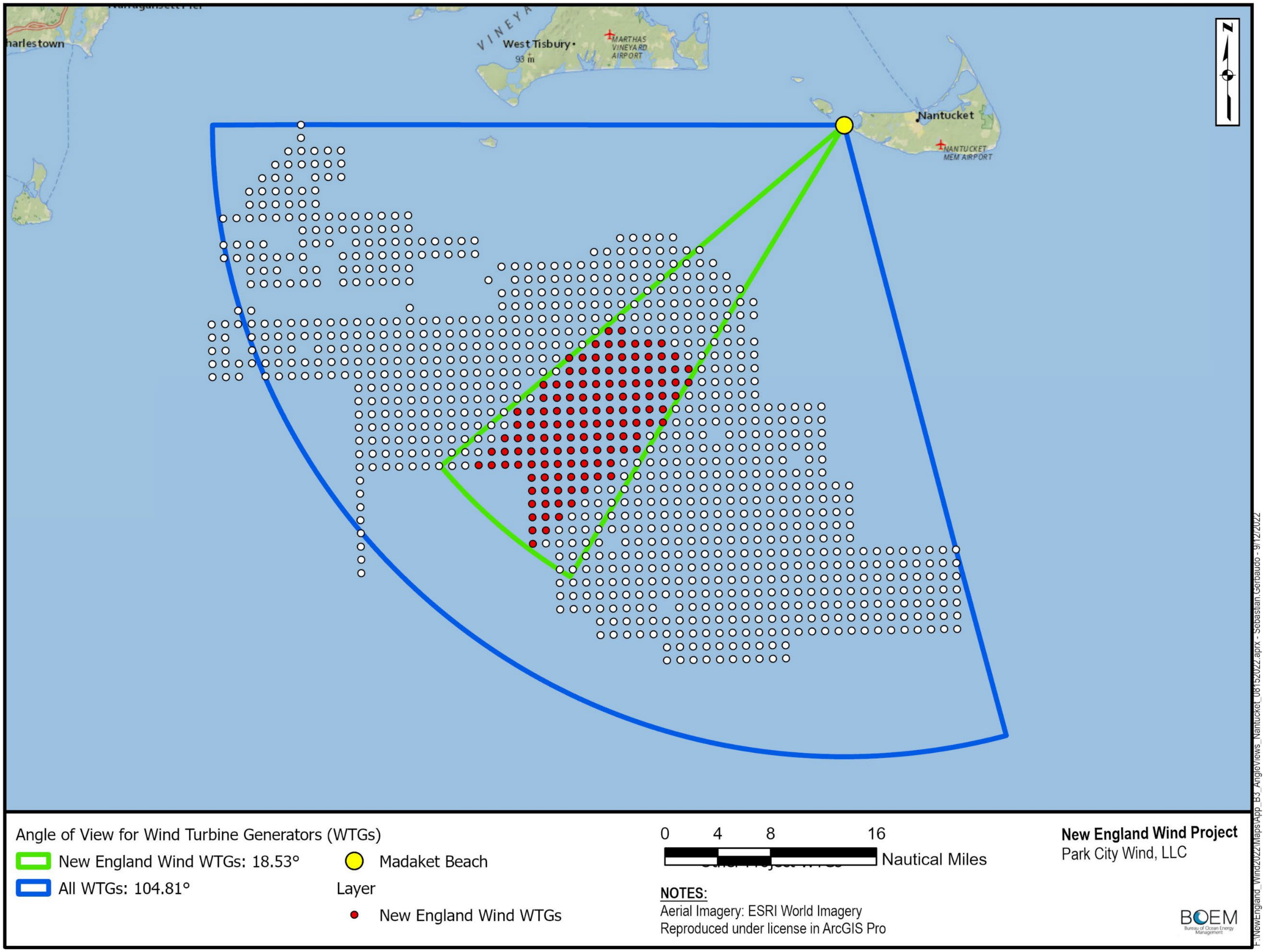


Figure I-3-3: Angle of Views to Turbines Theoretically Visible to Madaket Beach

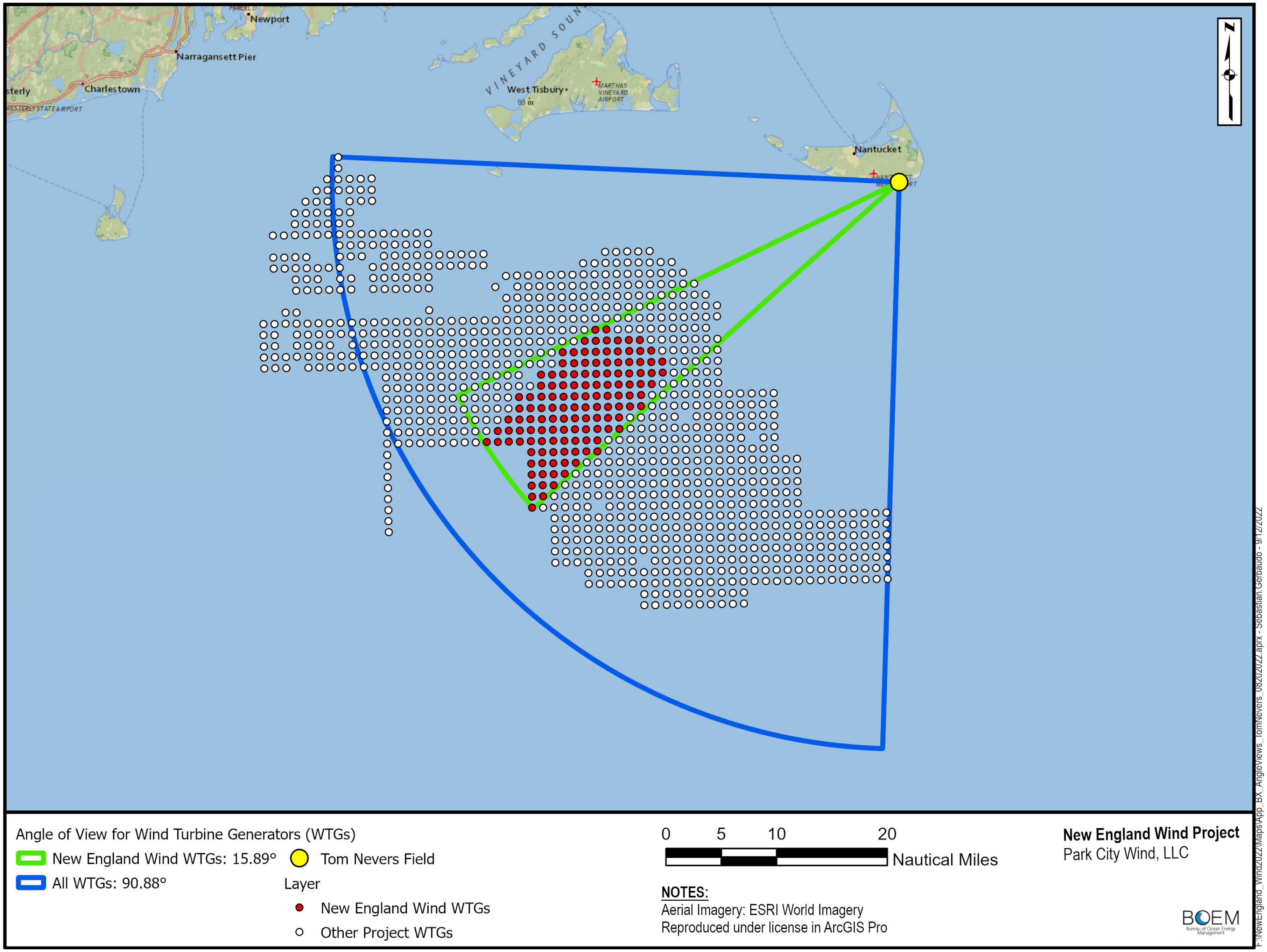


Figure I-3-4: Angle of Views to Turbines Theoretically Visible to Tom Nevers Field

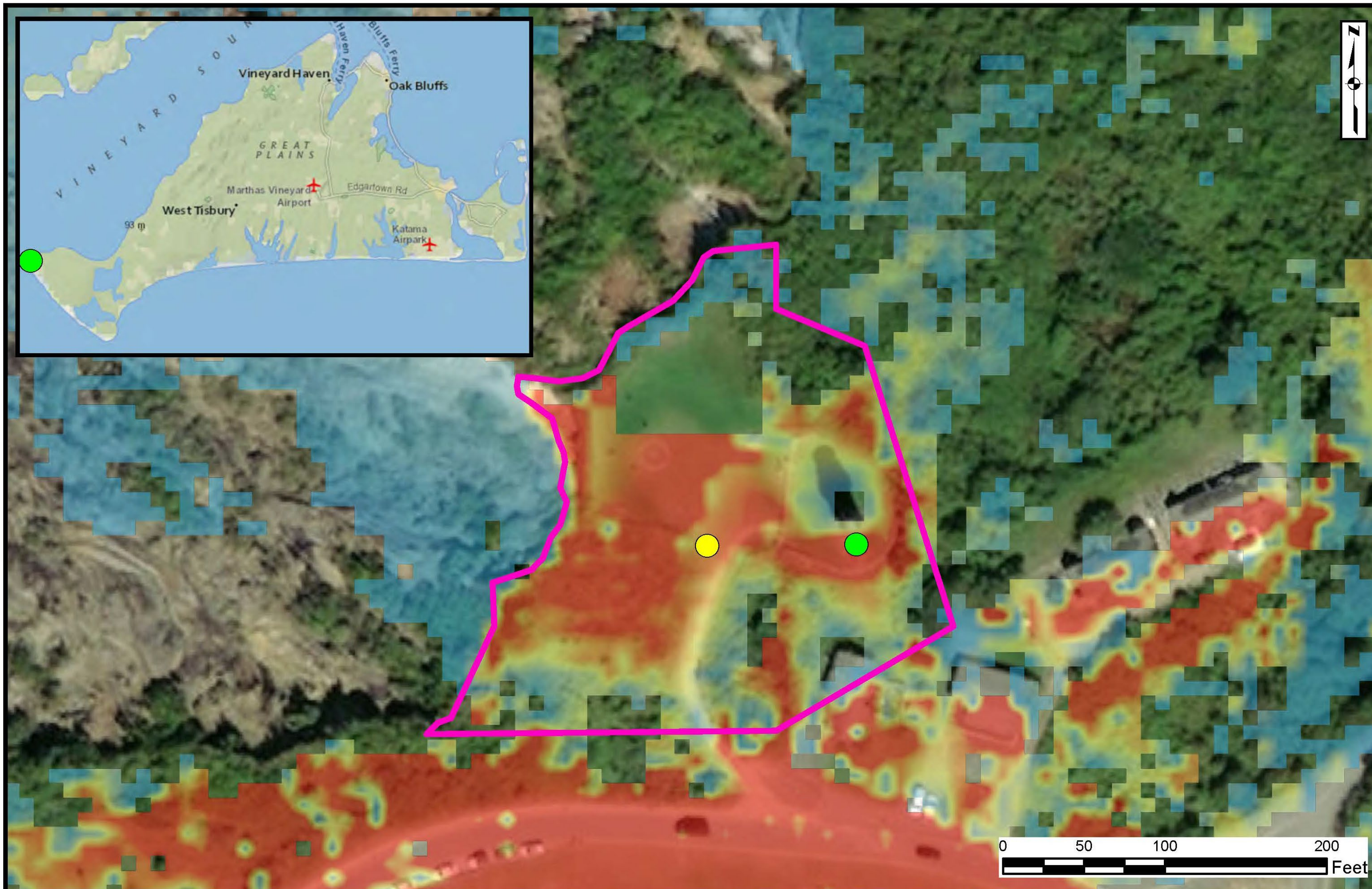
ATTACHMENT I-4: INTERVISIBILITY MAPS

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



Gay Head Lighthouse

Field in Site

Gay Head Lighthouse Area

Number of Visible Turbines

High: 854

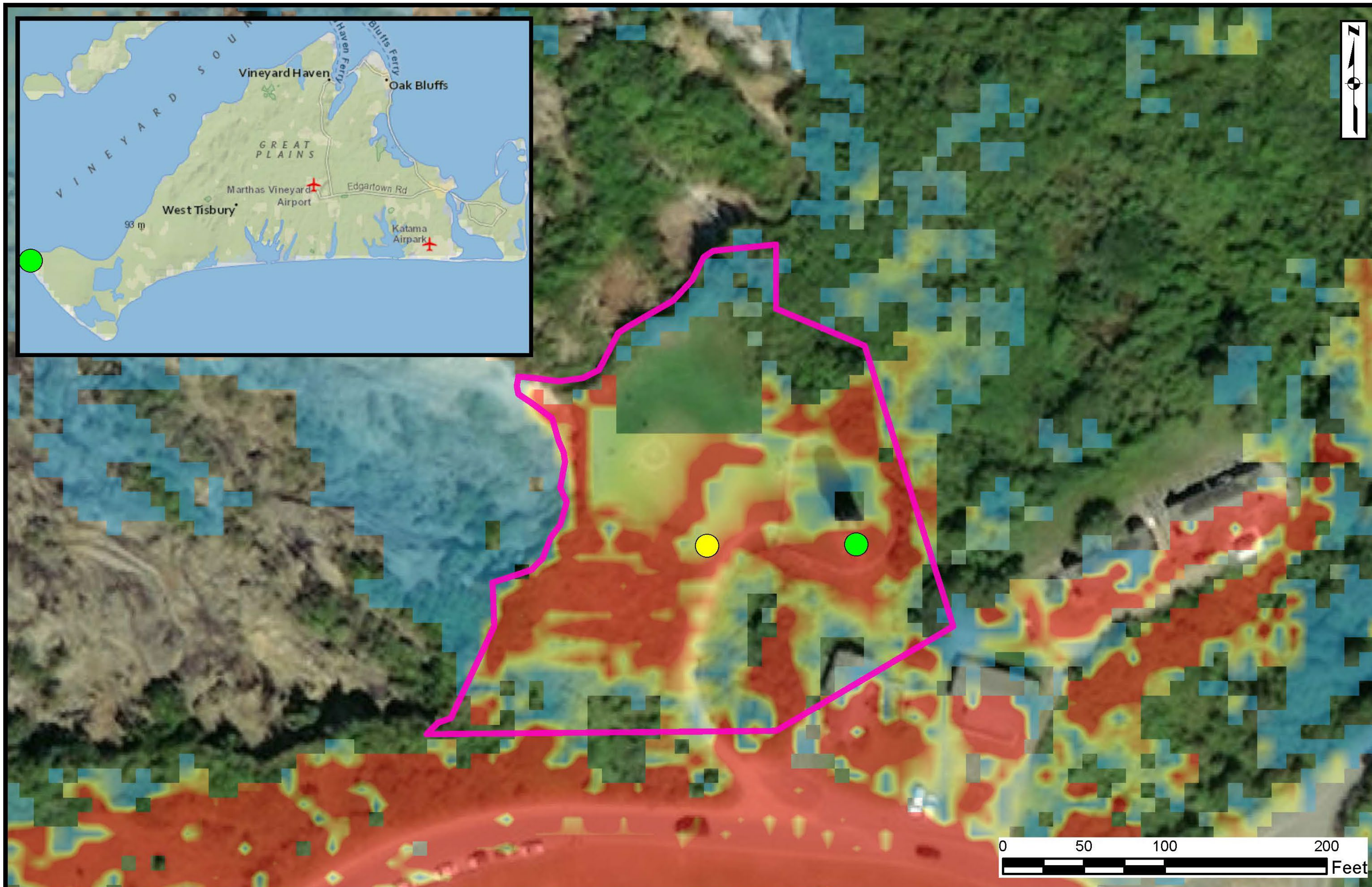
Low: 1

Appendix I-4-1a

NOTES:
Aerial Imagery: ESRI World Imagery Reproduced under license in ArcGIS Pro

Cumulative Turbine Viewshed
Gay Head Lighthouse
Park City Wind, LLC

BOEM



Gay Head Lighthouse
Field in Site
Gay Head Lighthouse Area

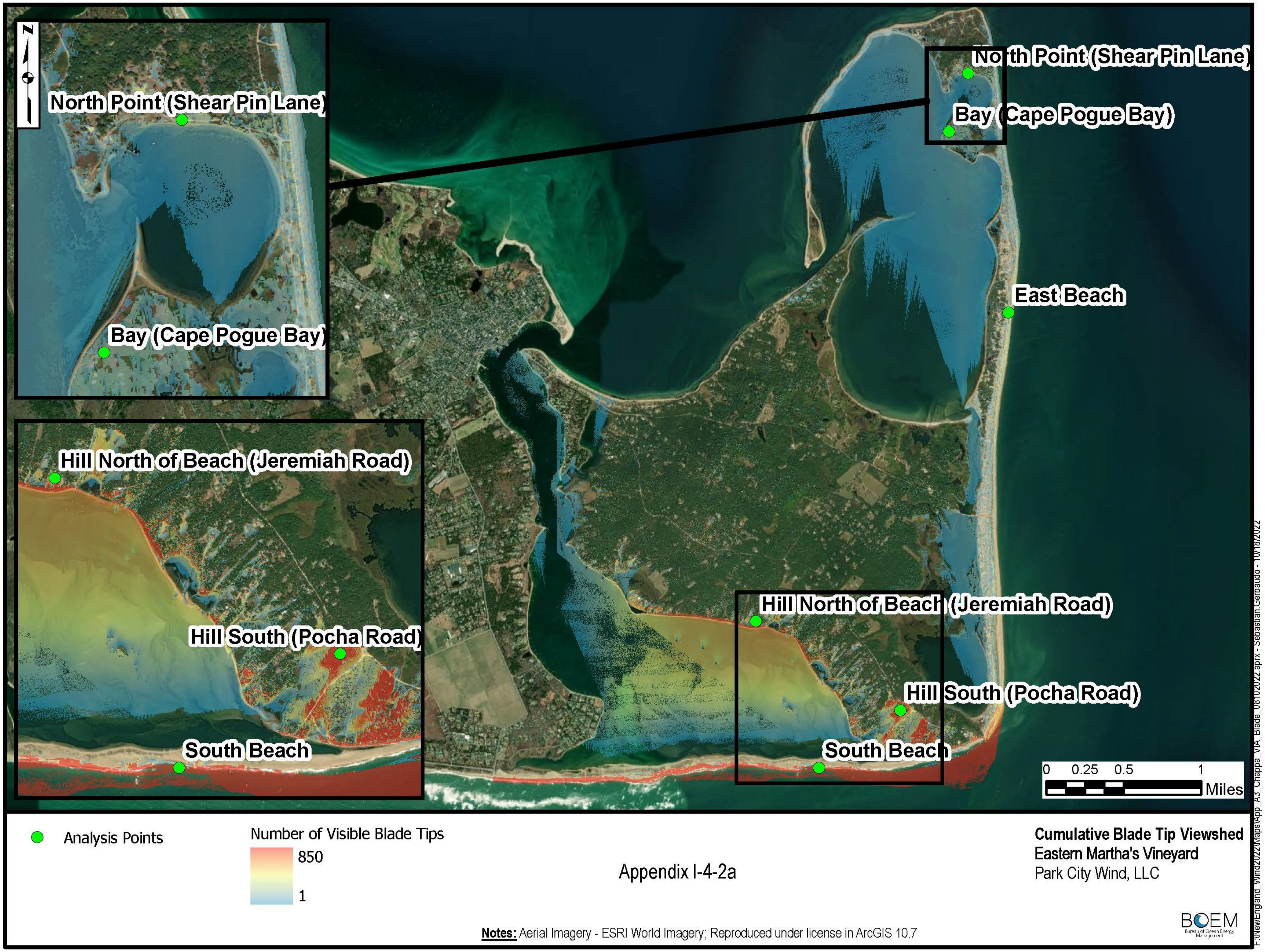
Number of Visible Nacelles
High: 845
Low: 1

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


North Point (Shear Pin Lane)
Bay (Cape Pogue Bay)
Hill North of Beach (Jeremiah Road)
Hill South (Pocha Road)
South Beach
North Point (Shear Pin Lane)
Bay (Cape Pogue Bay)
East Beach
Hill North of Beach (Jeremiah Road)
Hill South (Pocha Road)
South 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

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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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Tuckernuck Beach
Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-3b
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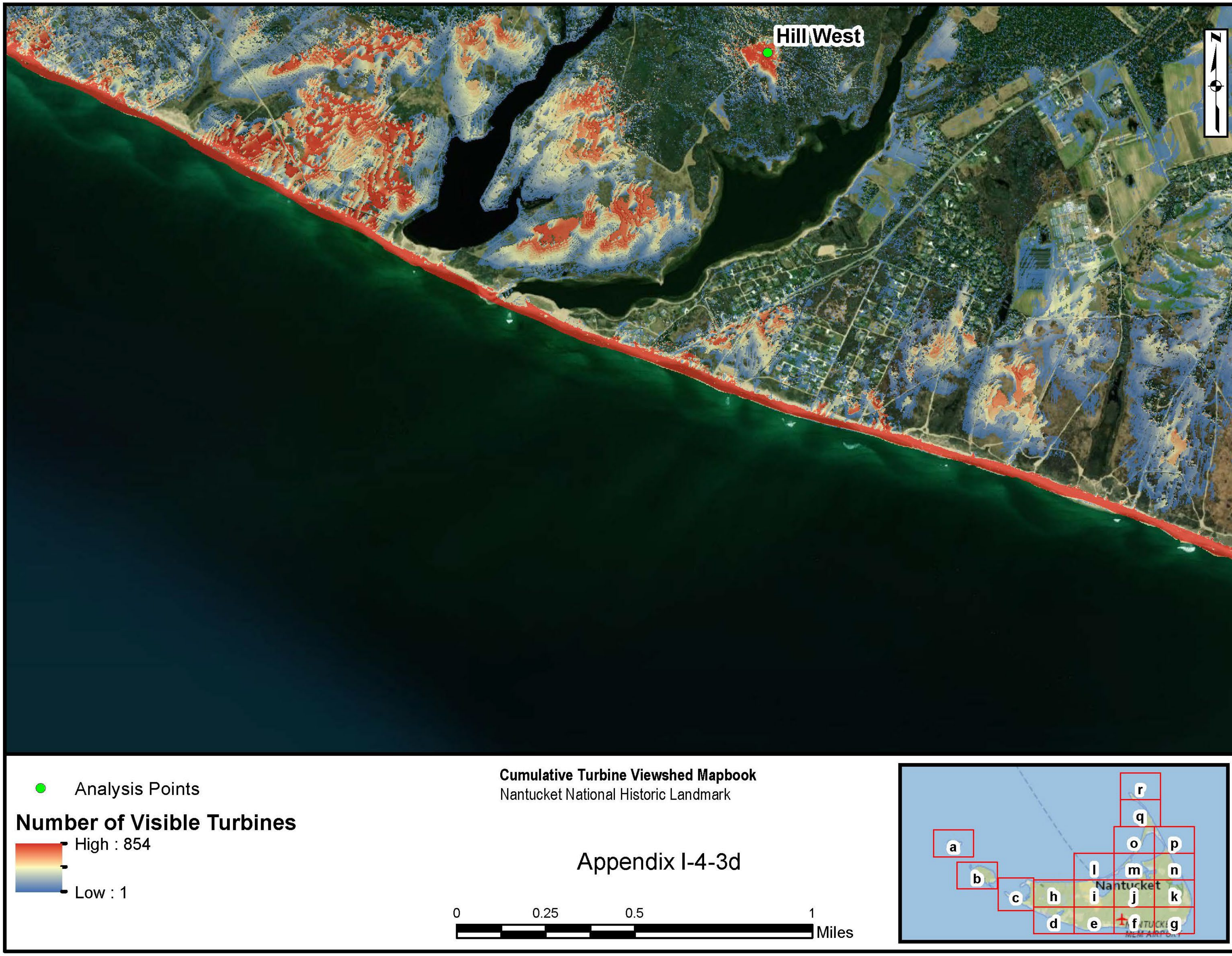
Nantucket

Appendix I-4-3c



Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark

Appendix I-4-3d

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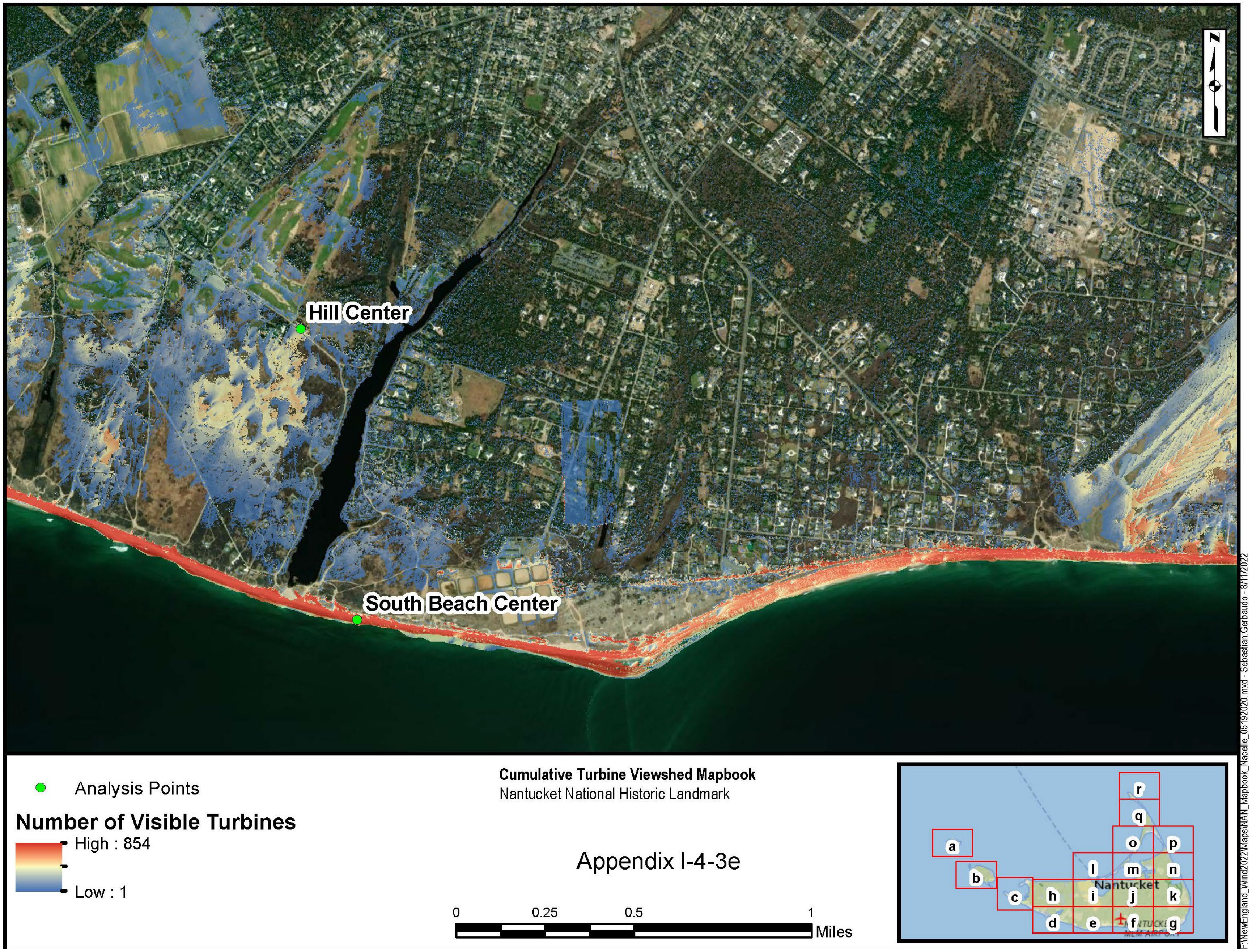
Hill Center
South Beach Center
Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
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Analysis Points

Number of Visible Turbines

High : 854

Low : 1

Cumulative Turbine Viewshed Mapbook

Nantucket National Historic Landmark

Appendix I-4-3f

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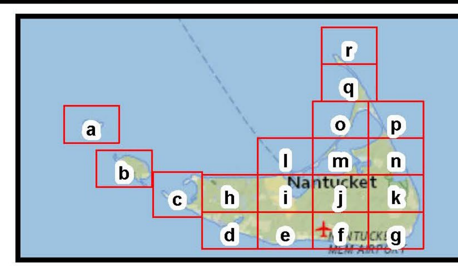

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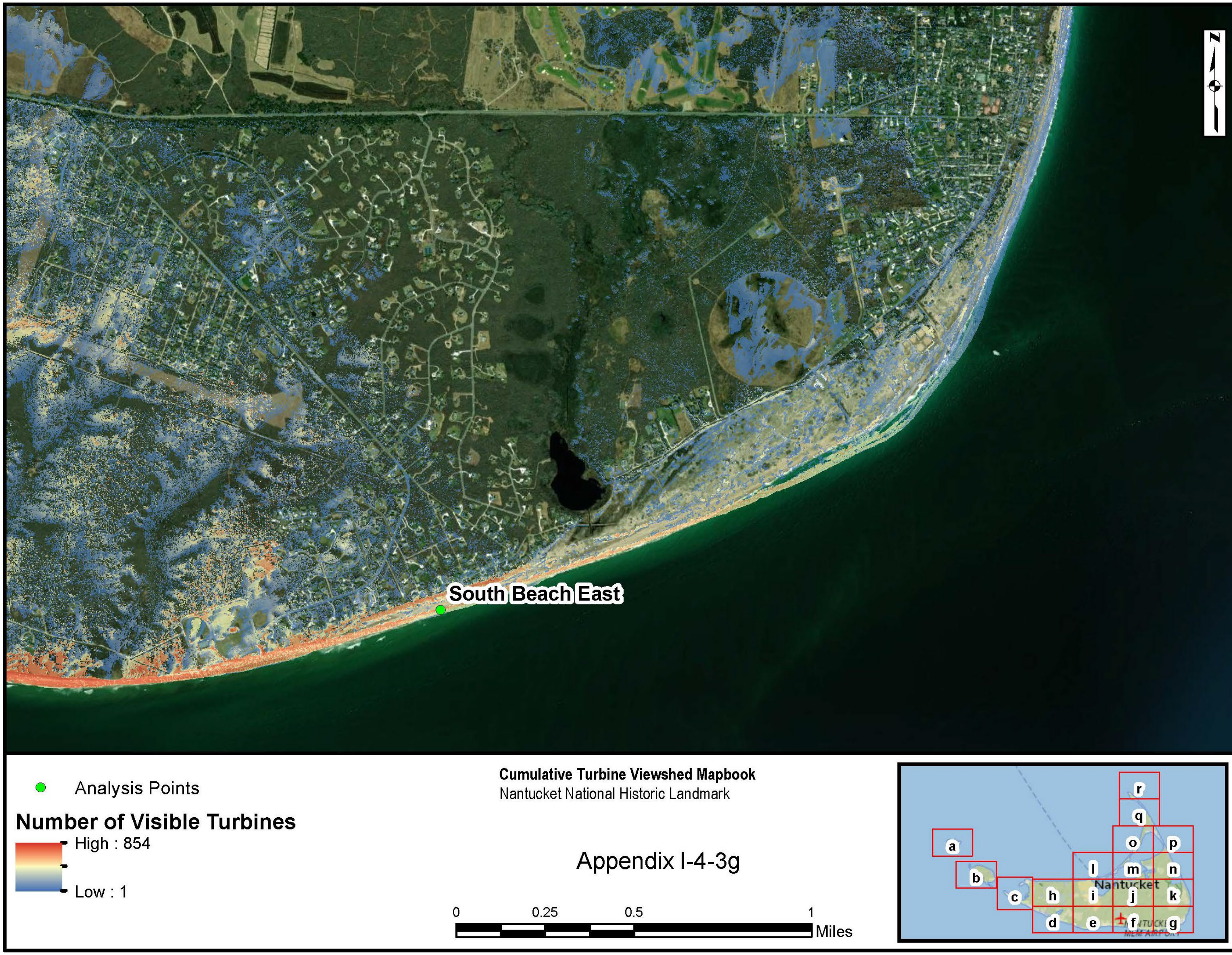

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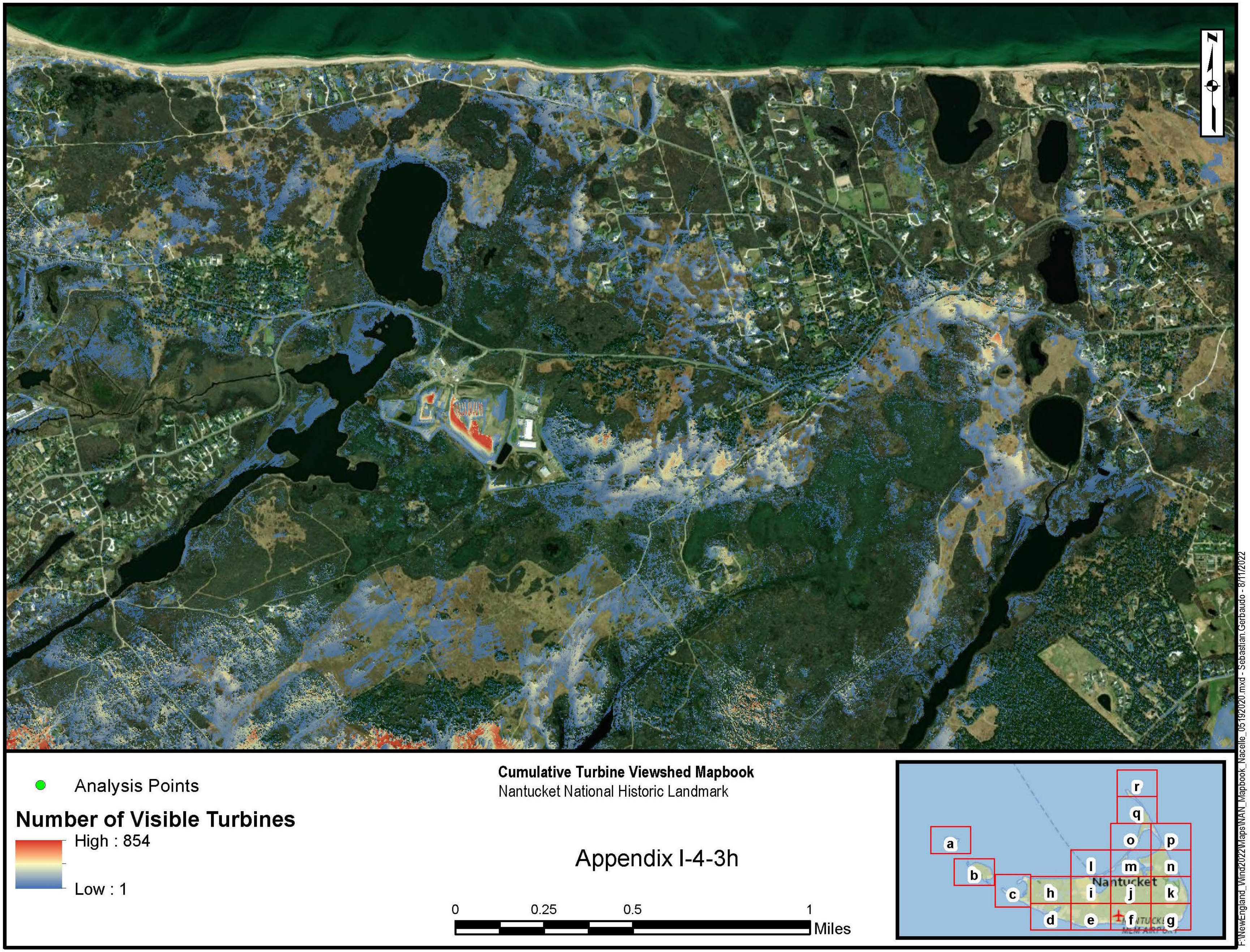
Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
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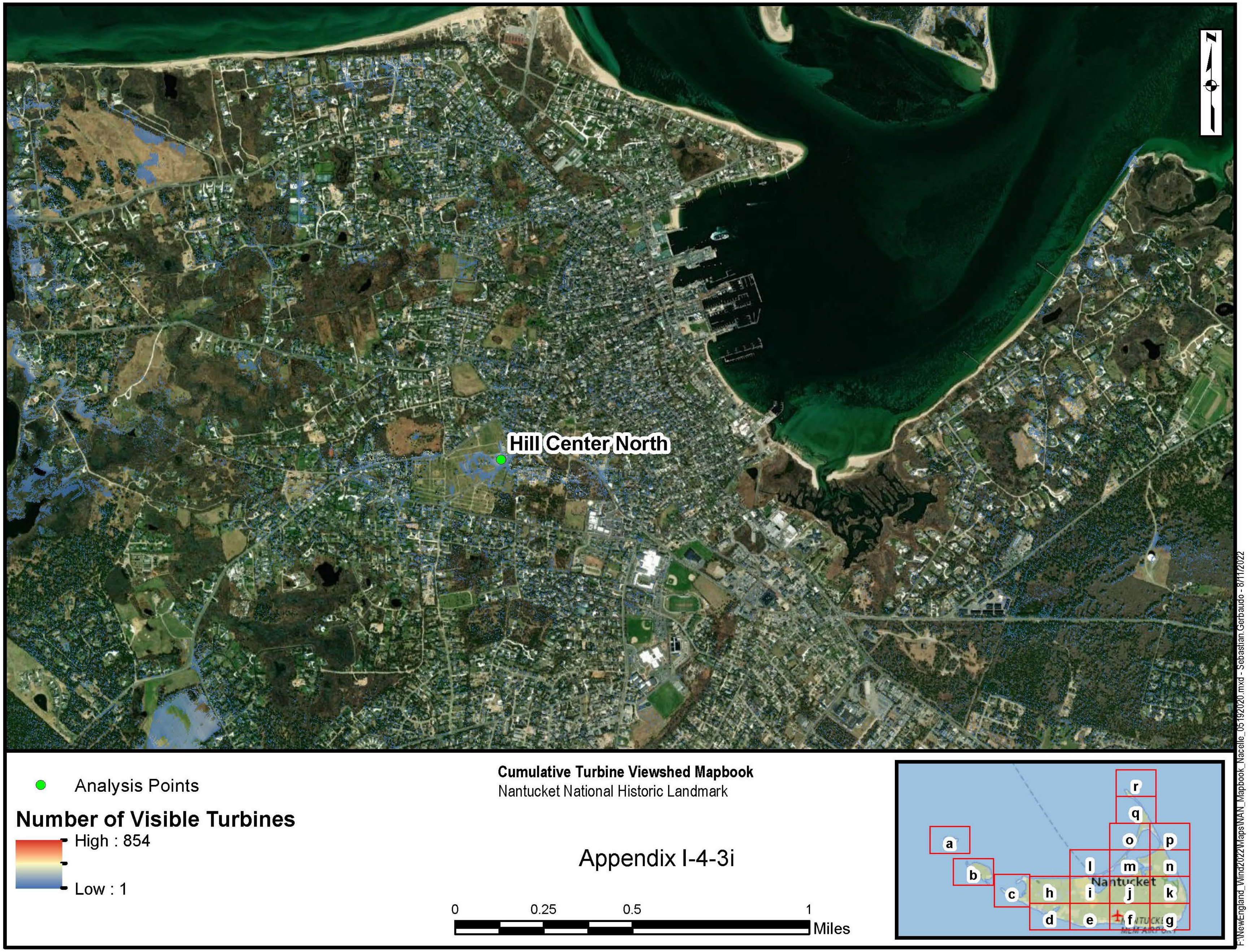

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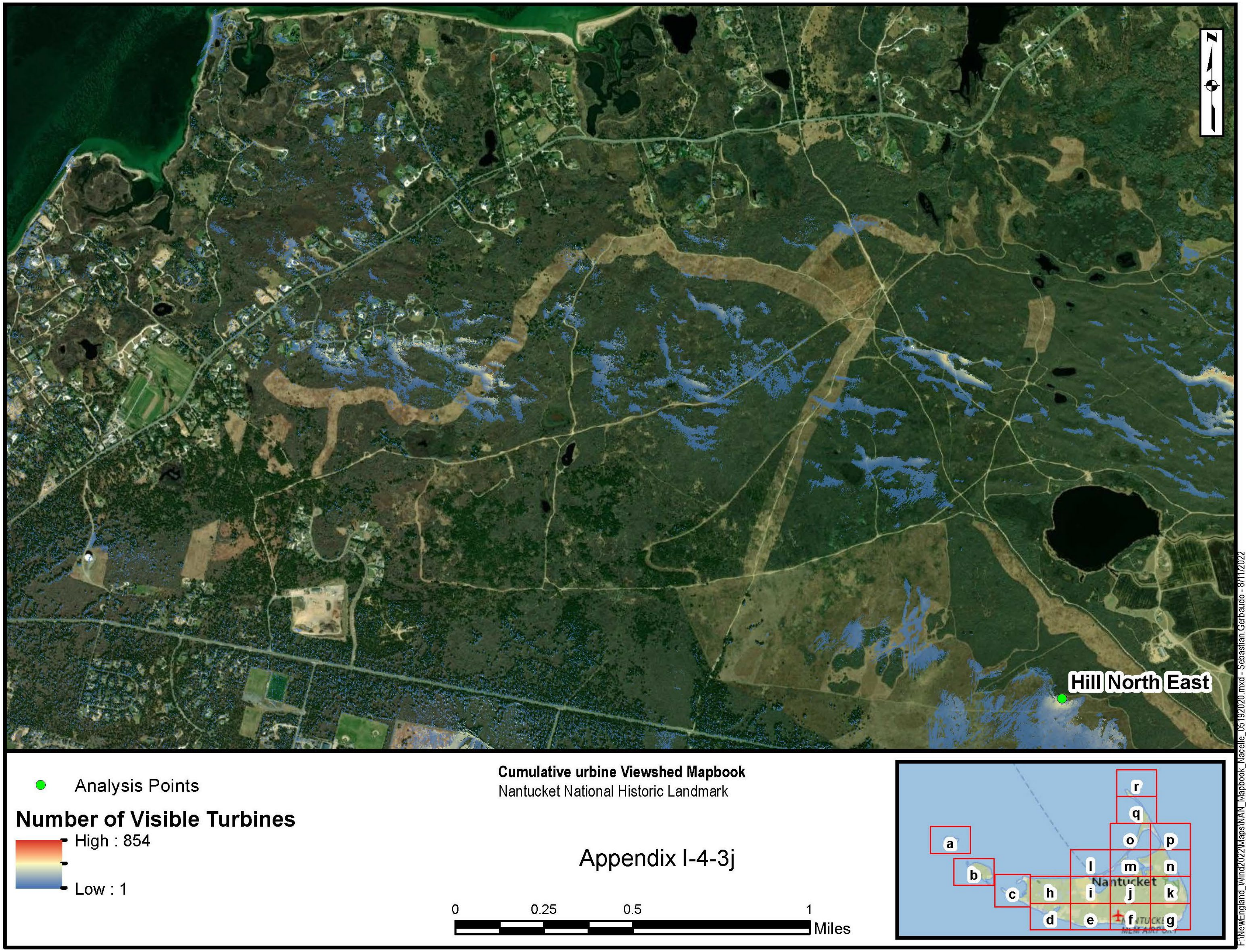
Hill North East
Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative urbine Viewshed Mapbook
Nantucket National Historic Landmark
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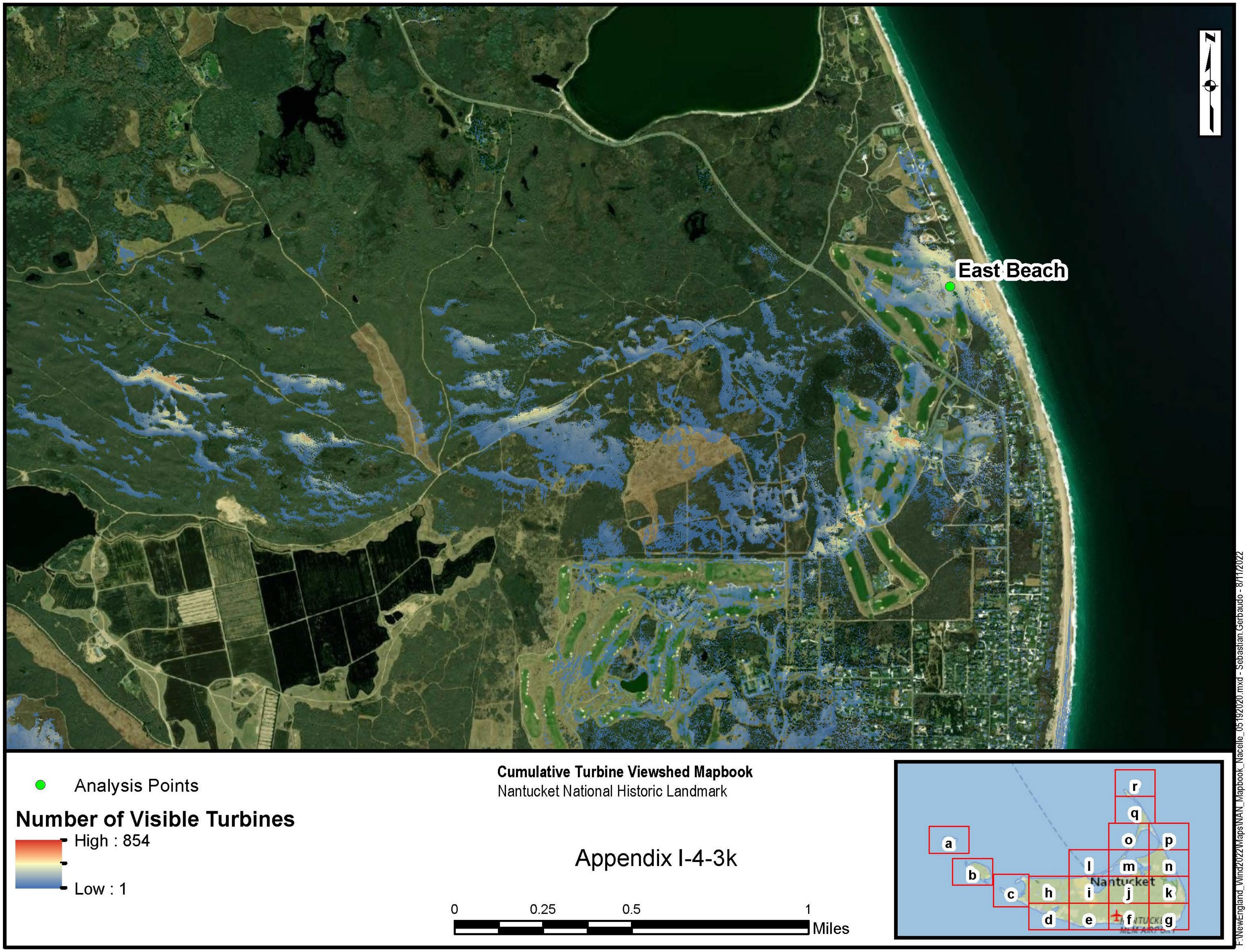

Appendix I-4-3k


Analysis Points
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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-4-3m
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Nantucket

Appendix I-4-3n

Appendix I-4-3o


Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-3p
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North Isthmus
Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-3q
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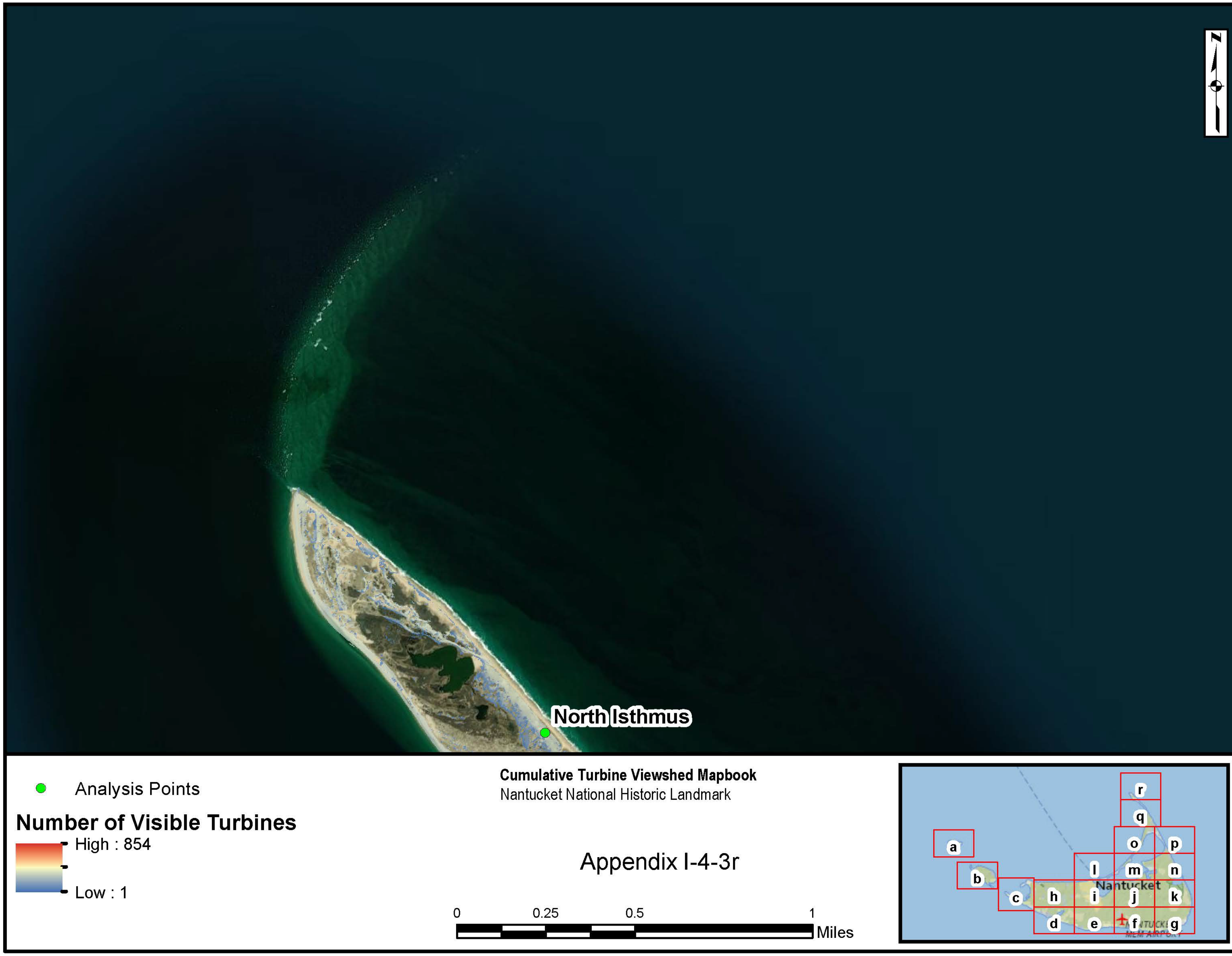
North Isthmus
Analysis Points
Number of Visible Turbines
High : 854
Low : 1
Cumulative Turbine Viewshed Mapbook
Nantucket National Historic Landmark
Appendix I-4-3r
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Appendix I-4-4a

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Tuckernuck Beach
Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
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South Beach West
Analysis Points
Number of Visible Nacelles
High : 845
Low : 1
Cumulative Nacelle Viewshed Mapbook
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Hill West
Analysis Points
Number of Visible Nacelles
High : 845
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Cumulative Nacelle Viewshed Mapbook
Nantucket National Historic Landmark
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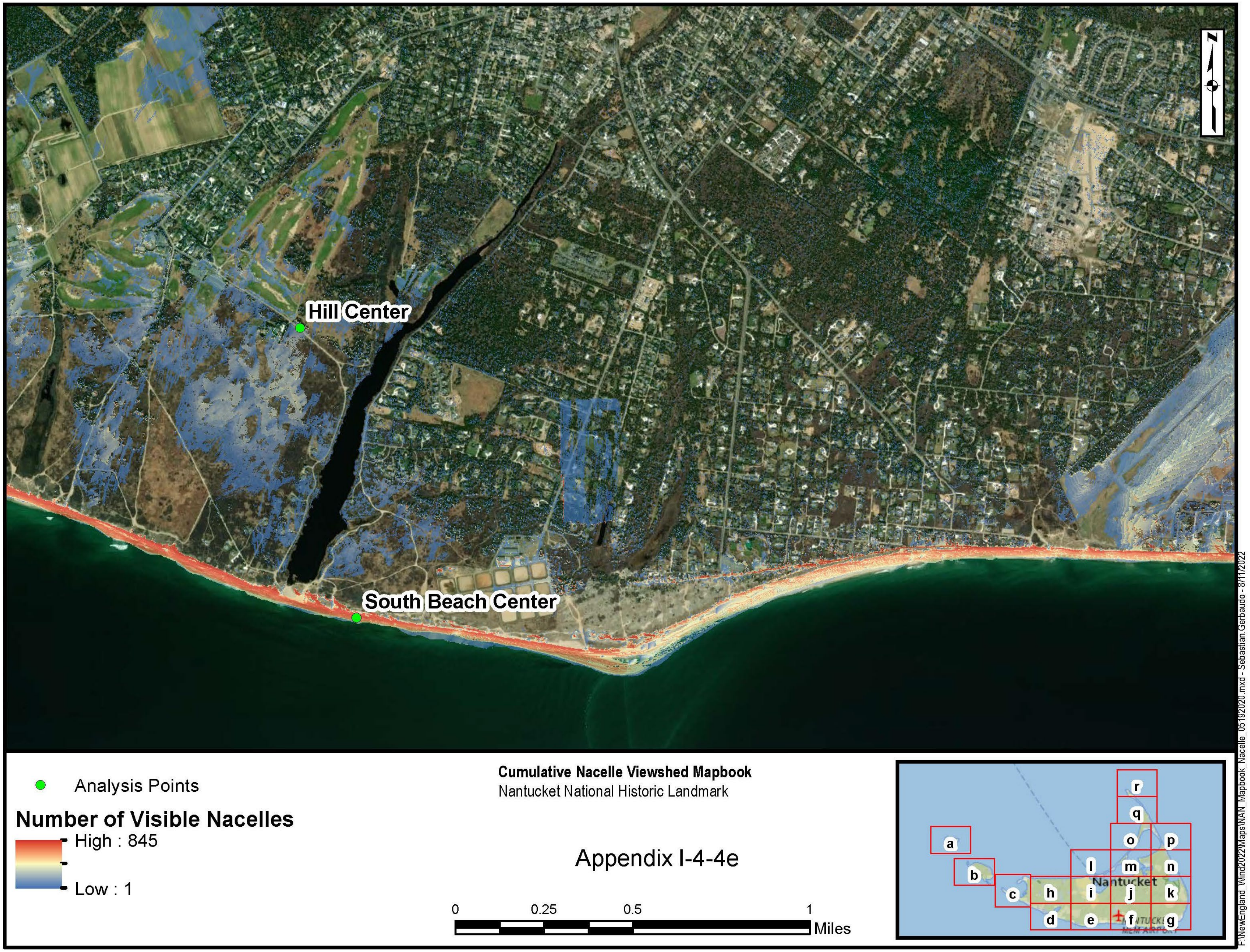
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South Beach Center
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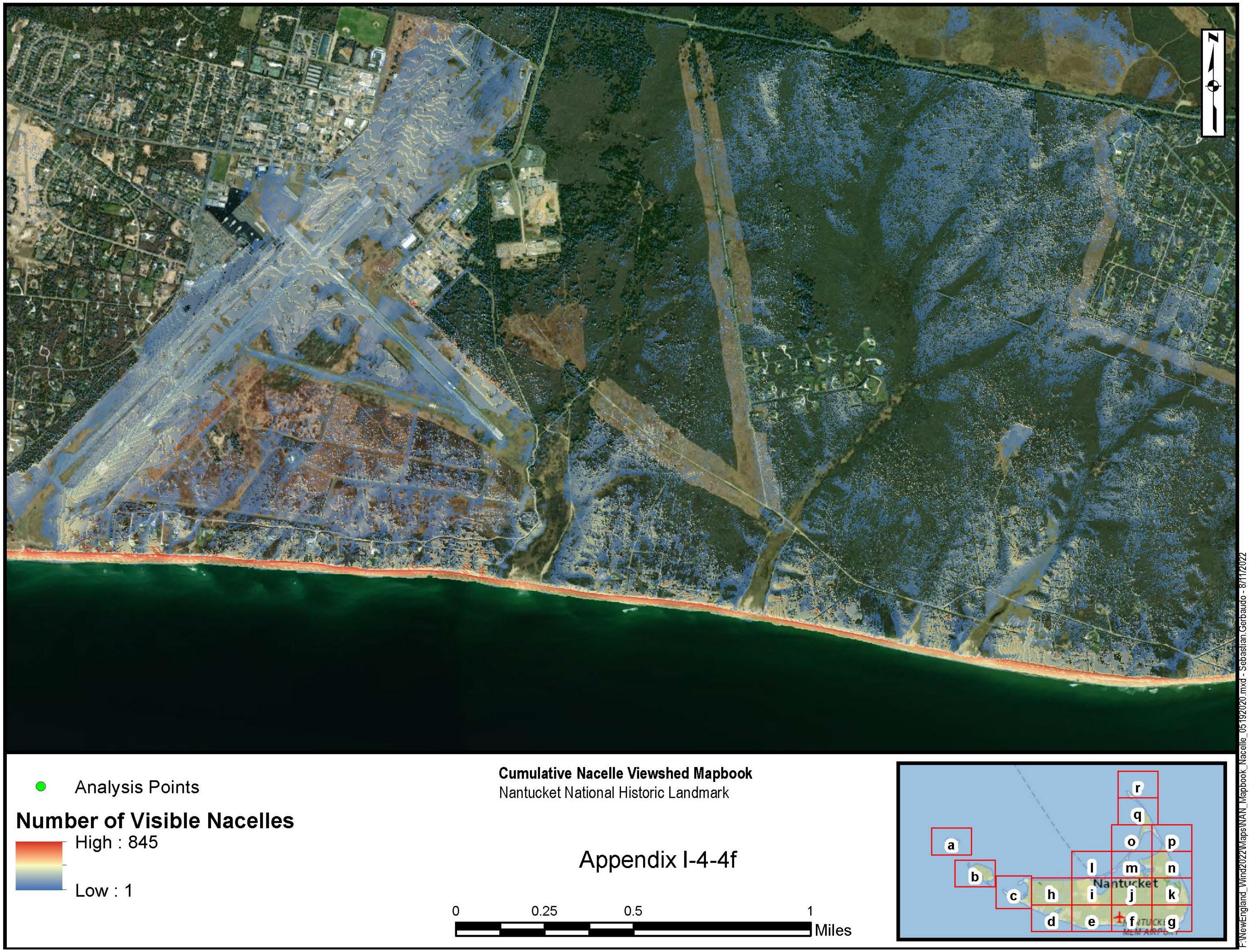

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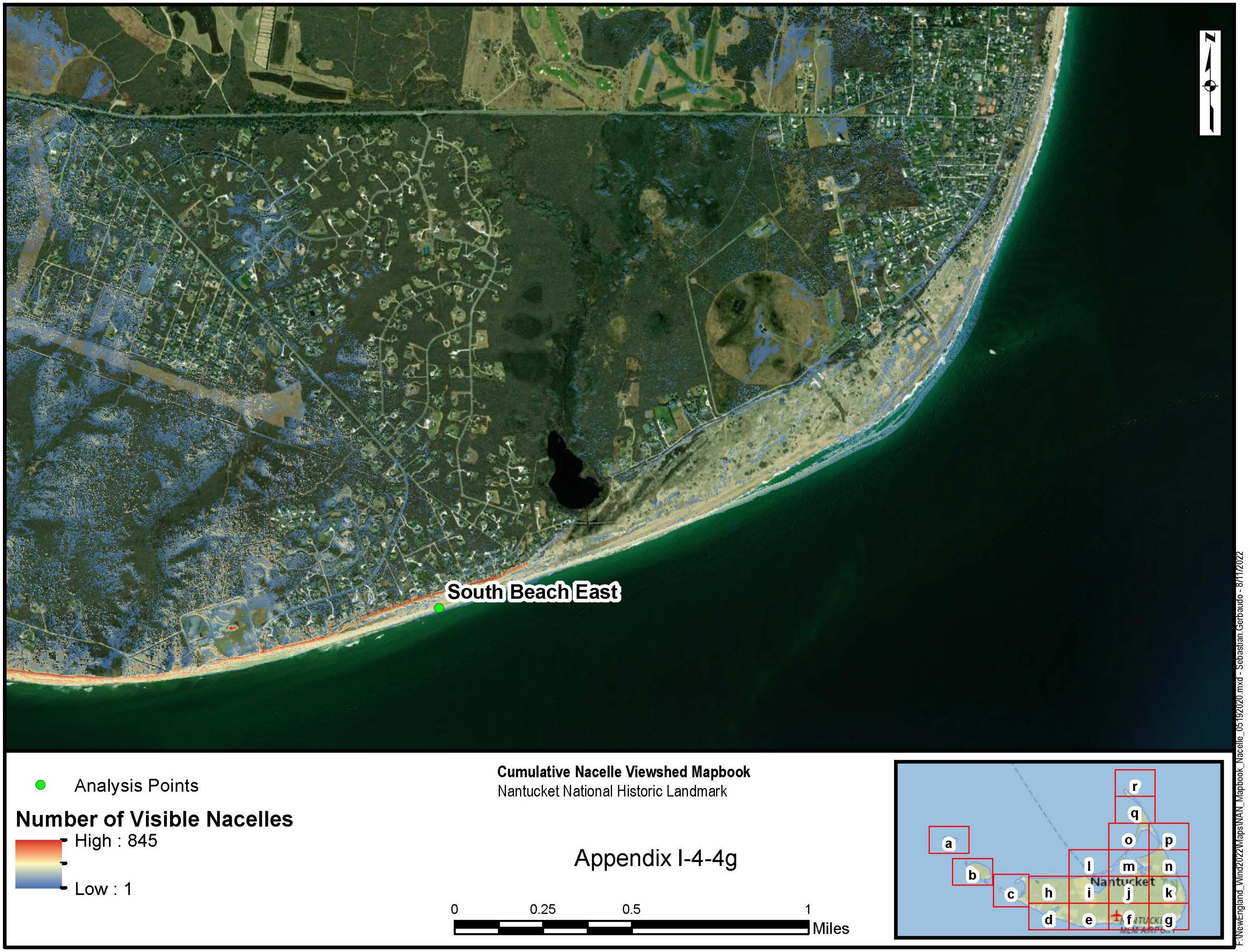
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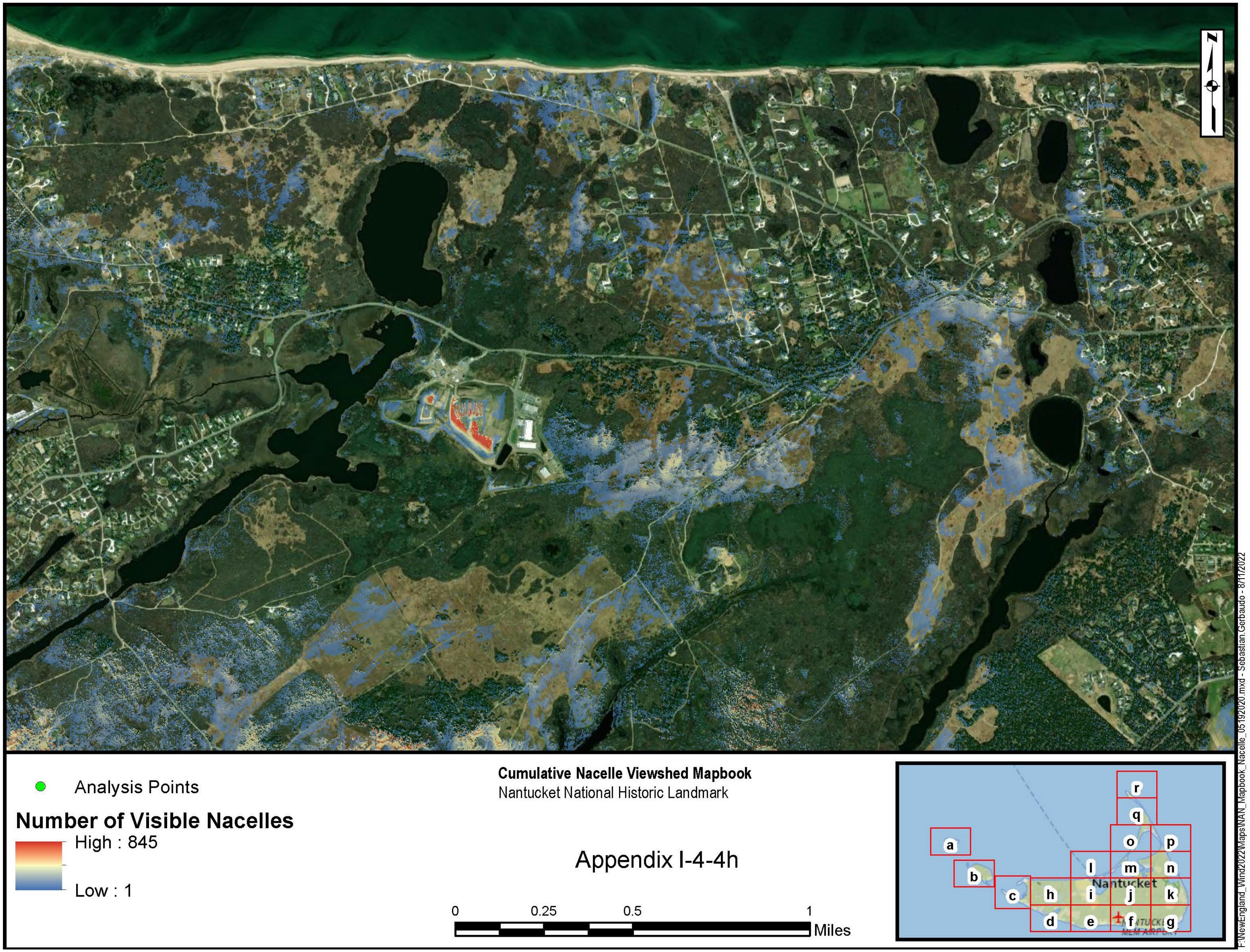
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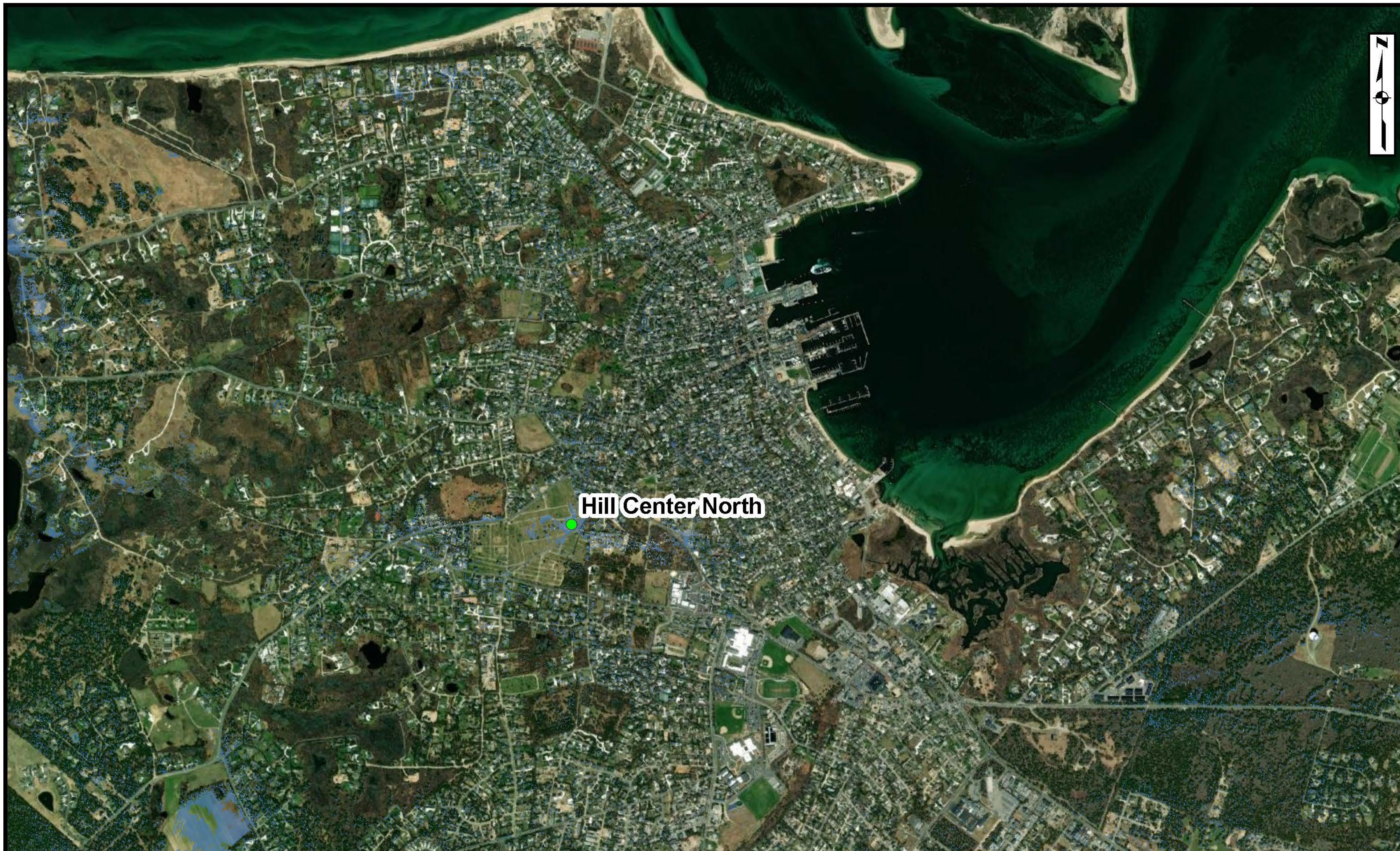

Analysis Points

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Cumulative Nacelle Viewshed Mapbook

Nantucket National Historic Landmark

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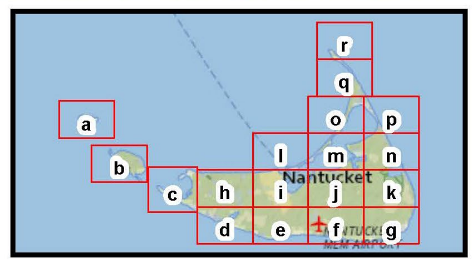

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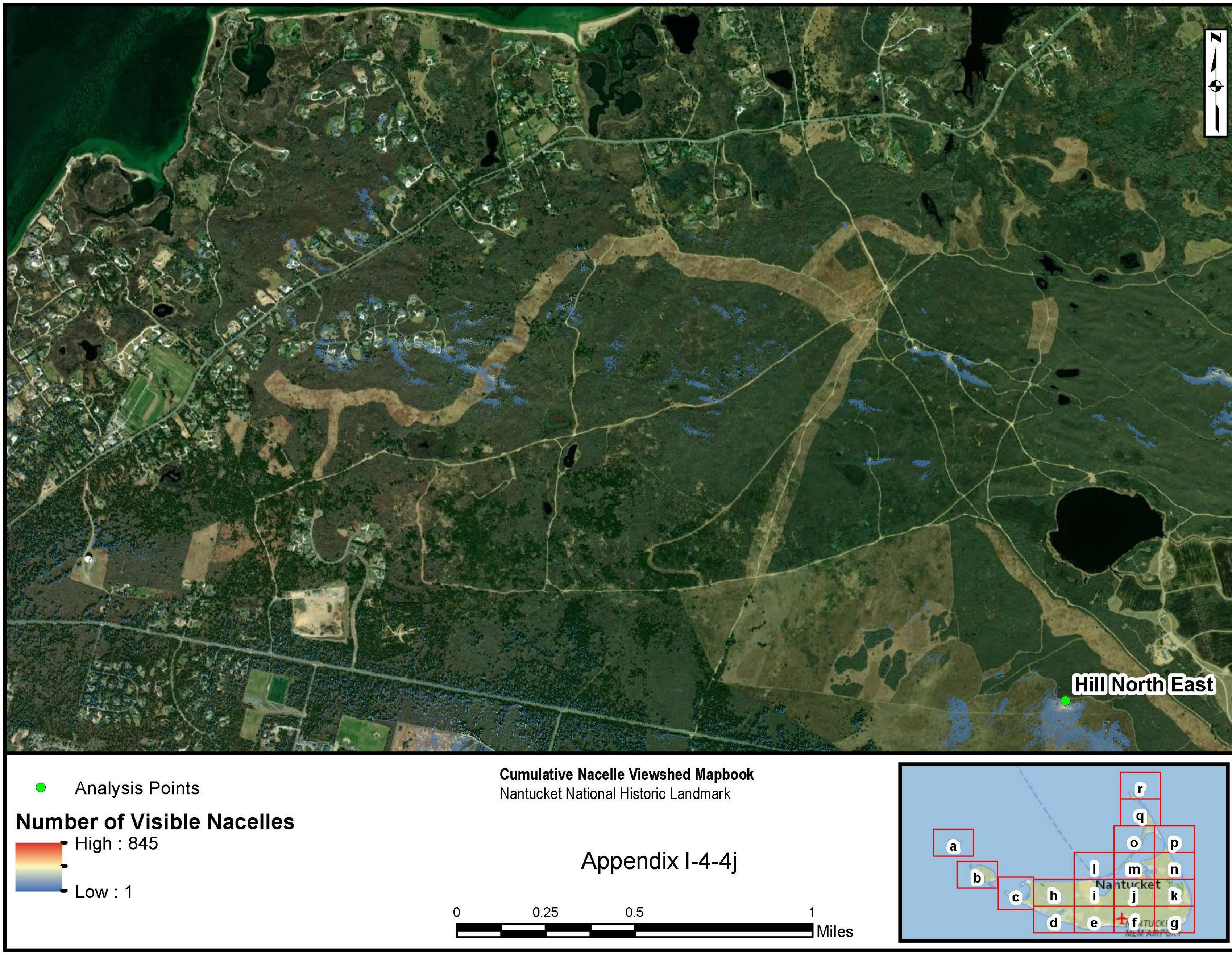
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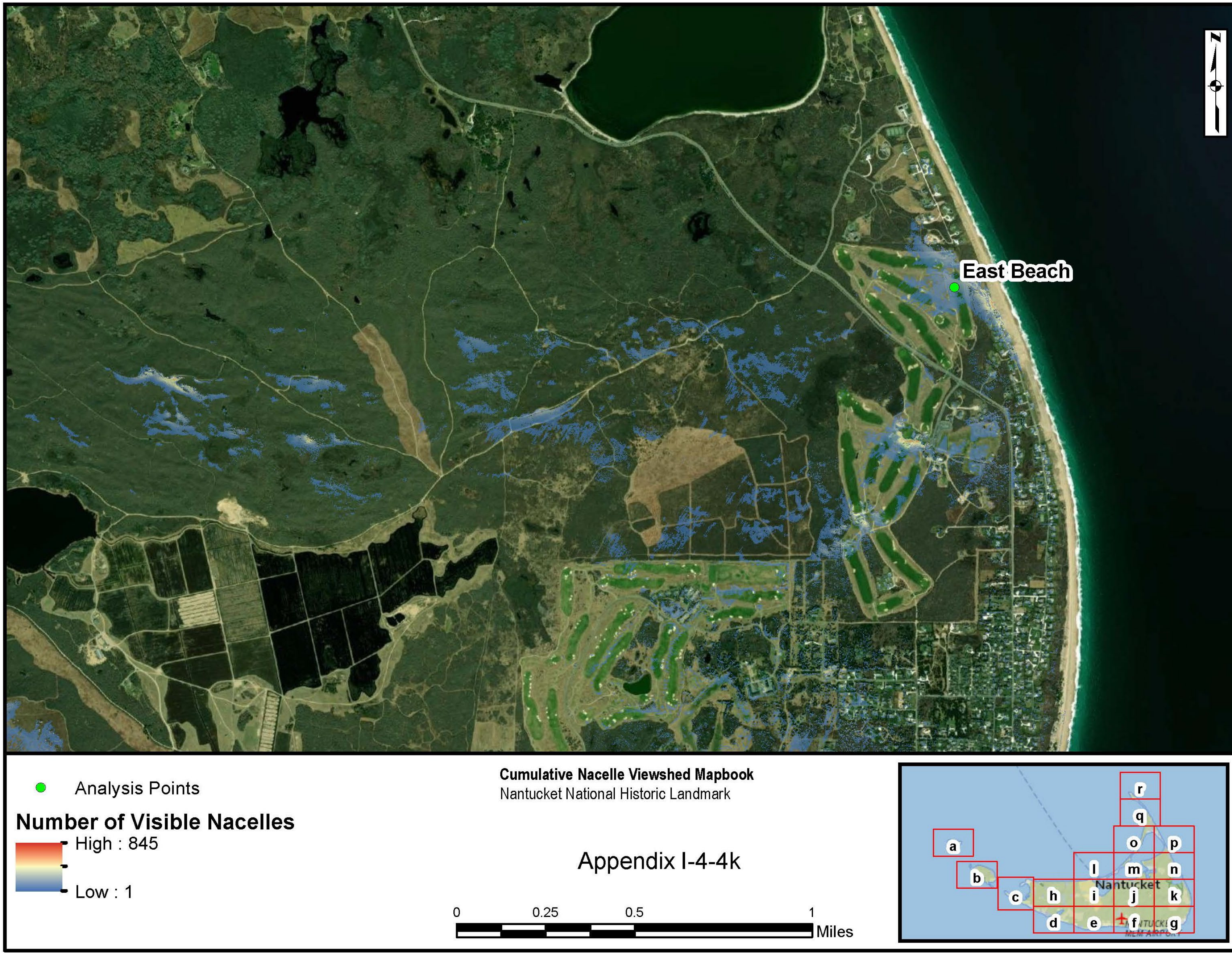

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Cumulative Nacelle Viewshed Mapbook
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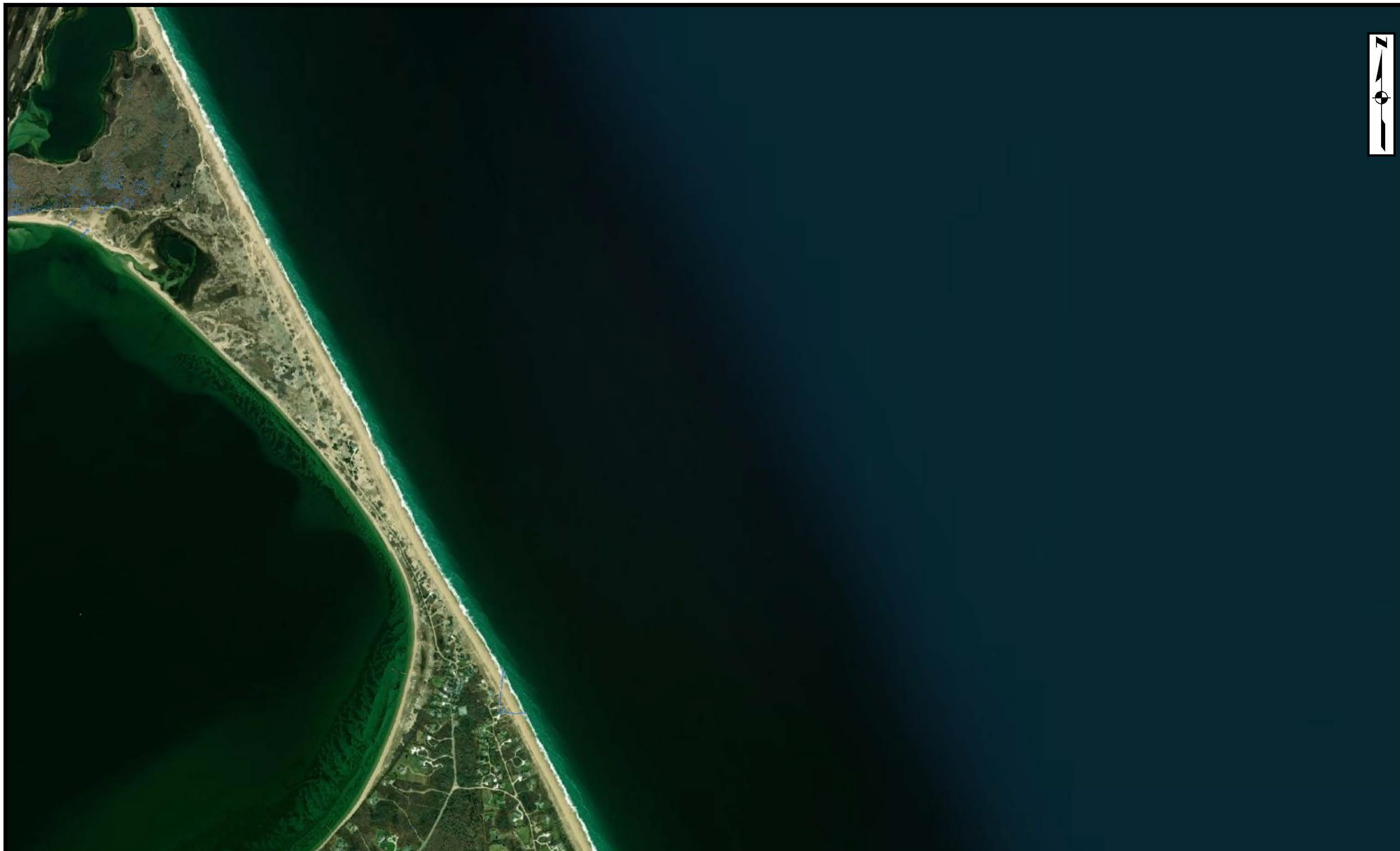

Analysis Points

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Cumulative Nacelle Viewshed Mapbook

Nantucket National Historic Landmark

Appendix I-4-4p

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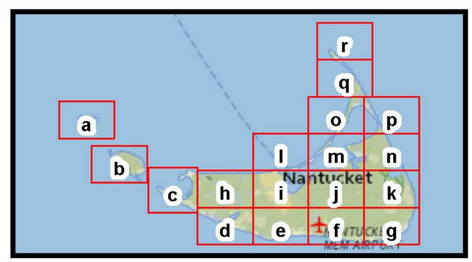

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North Isthmus
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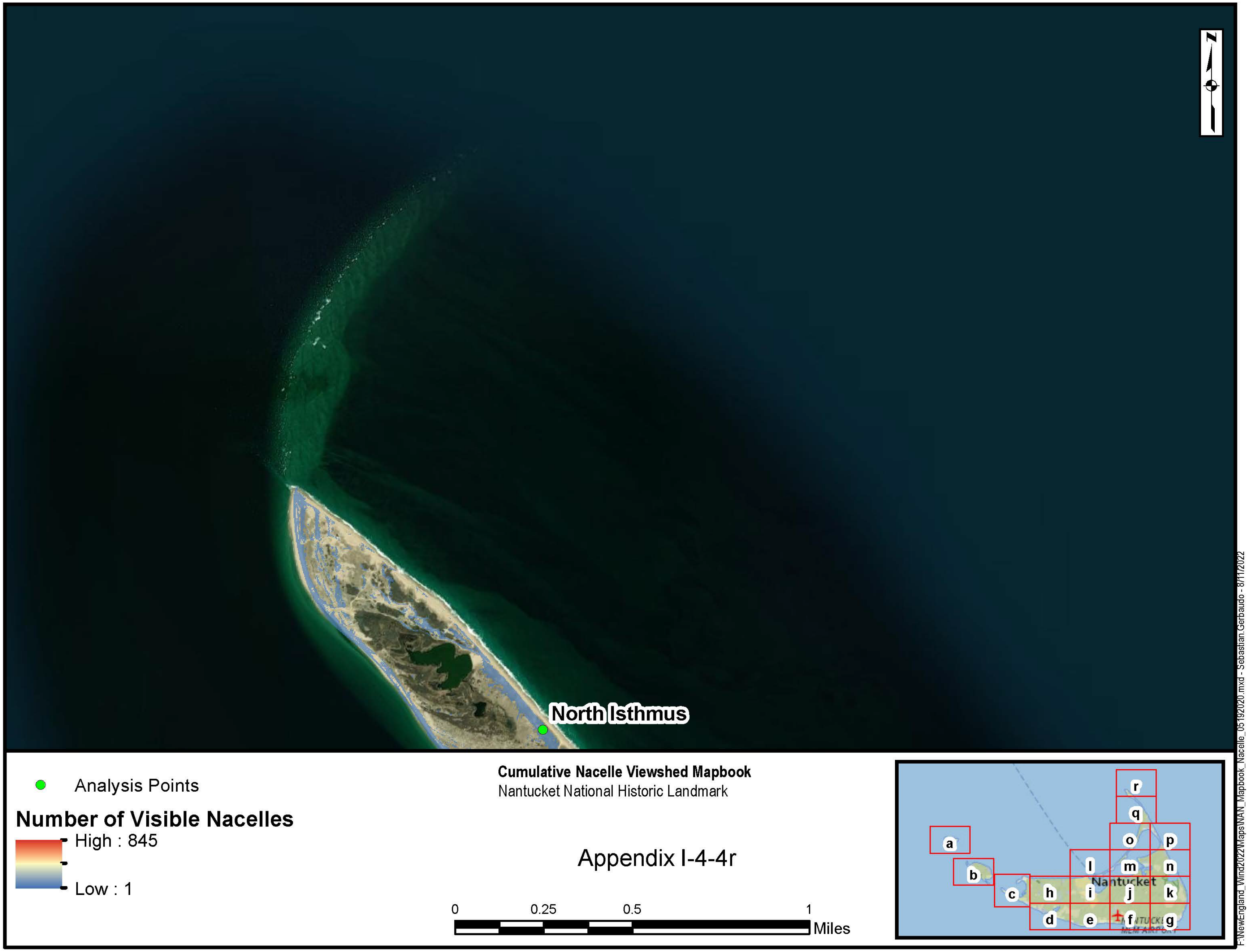
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Analysis Points
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Appendix J
Finding of Adverse Effect for the New England Wind Project Construction and Operations Plan

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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
ROD	Record of Decision
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
- 30 ancient submerged landform features on the Outer Continental Shelf (OCS) outside of these TCPs, for a total of 49 adversely affected ancient submerged landform features when combined with those that contribute to the Nantucket Sound TCP.

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 and August 2023), 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 2023) 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.

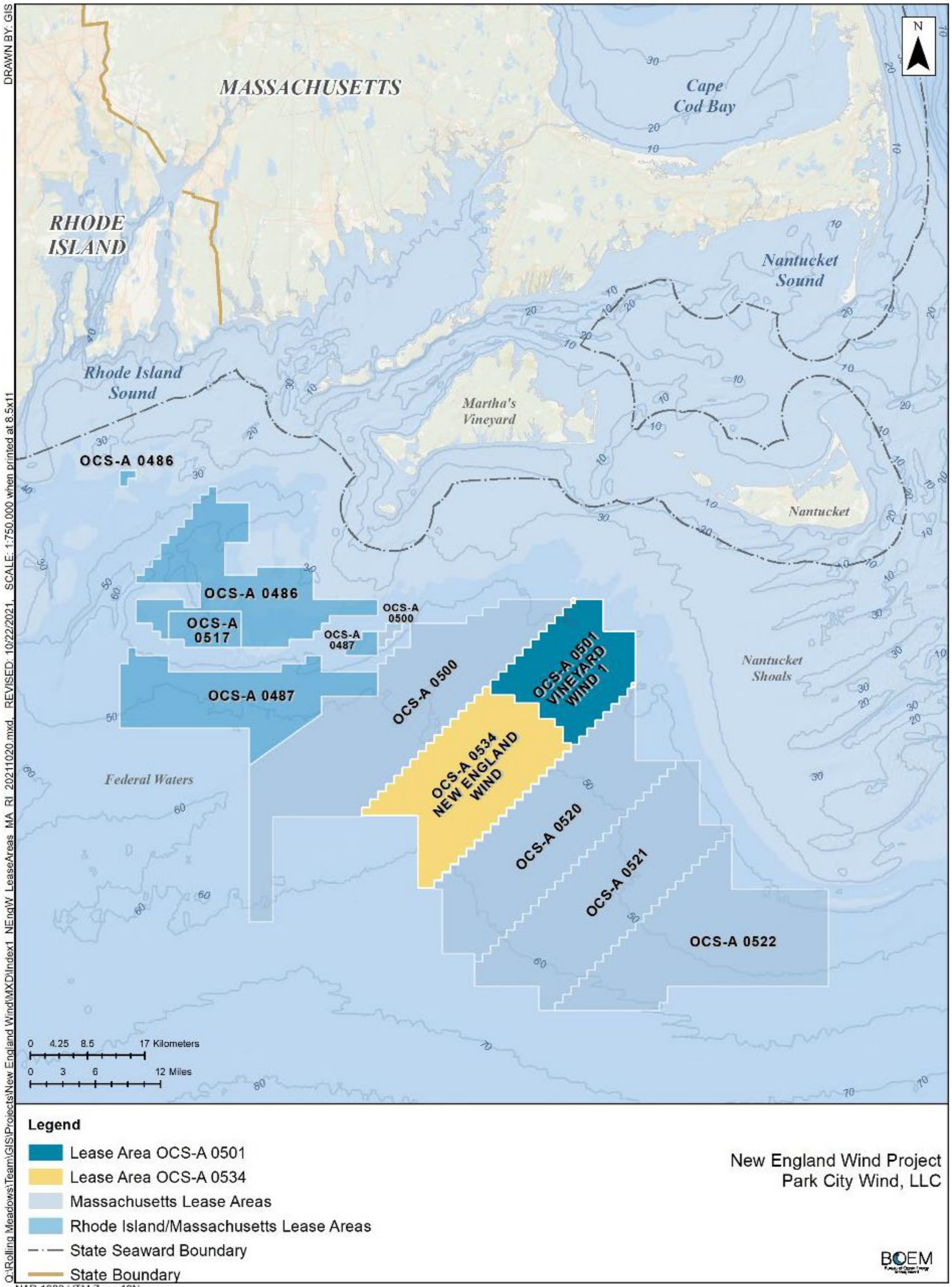

Figure J-1: Proposed Wind Development Area Relative to Rhode Island and Massachusetts Lease Areas

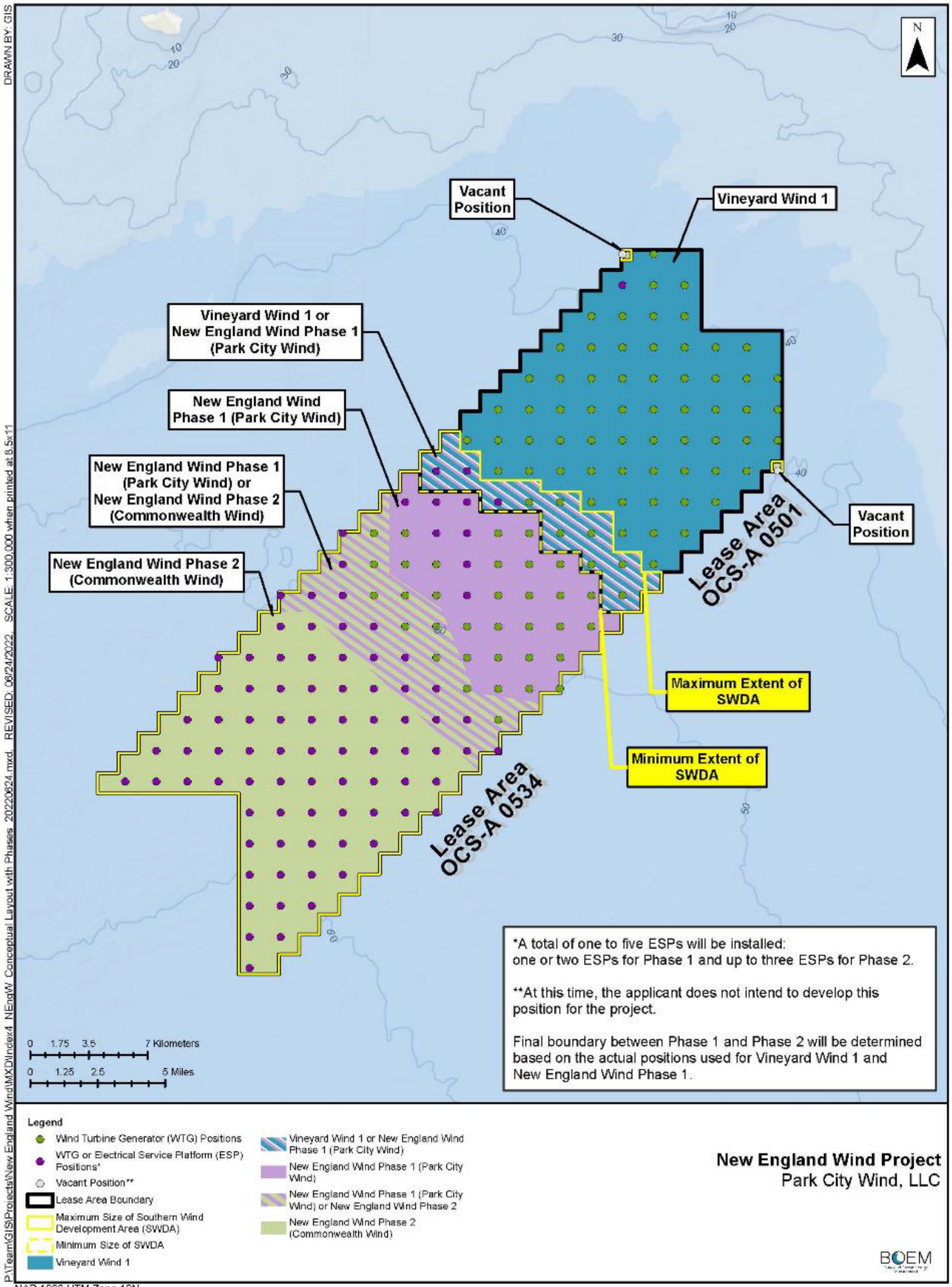

Figure J-2: Proposed Project Overview

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 Area 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, including 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, including 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 five offshore export cables (two for Phase 1 and 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 two 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 cable.

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.

Additionally, the applicant has identified an alternate Phase 2 onshore substation site called the Old Falmouth Road site; however, the applicant does not have site control. Therefore, this Finding of Adverse Effect does not evaluate the Old Falmouth Road site.

If the applicant determines that the SCV or the Old Falmouth Road site is necessary, phased identification and evaluation of historic properties for the remainder of the SCV or the Old Falmouth Road site 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 or the Old Falmouth Road site with the federally recognized tribal nations, Massachusetts State Historic Preservation Officer (SHPO), Advisory Council on Historic Preservation (ACHP), and other identified consulting parties, and the effects of the SCV or the Old Falmouth Road site to historic properties would be evaluated in a separate Finding and supplemental NEPA analysis.

If the SCV or the Old Falmouth Road site is used and information pertaining to identification of historic properties would not be available until after the Record of Decision (ROD) 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.

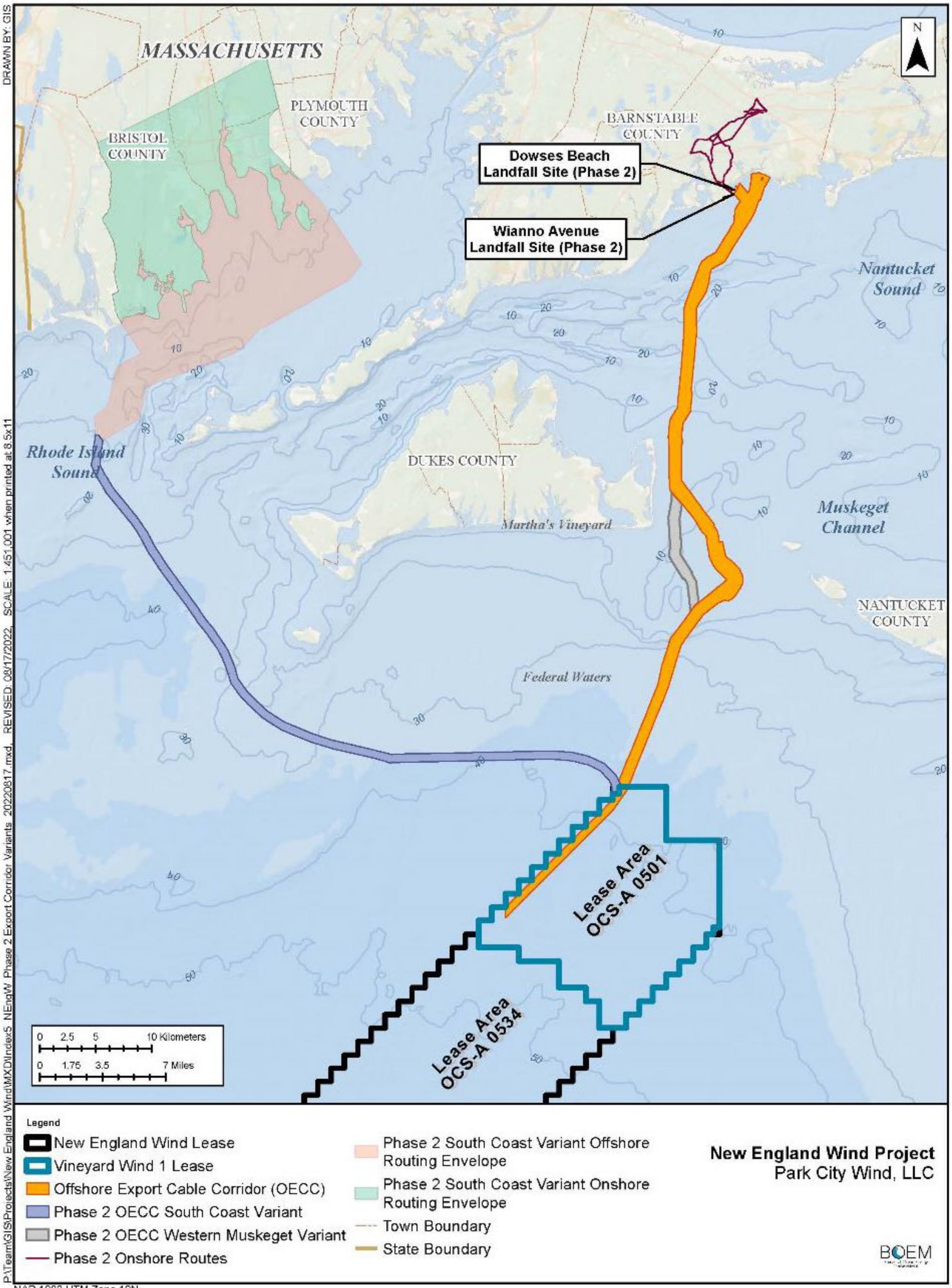


Figure J-3: Proposed Phase 2 Variants

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.

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. Figures J-5 through J-8 show the terrestrial APE for both phases.

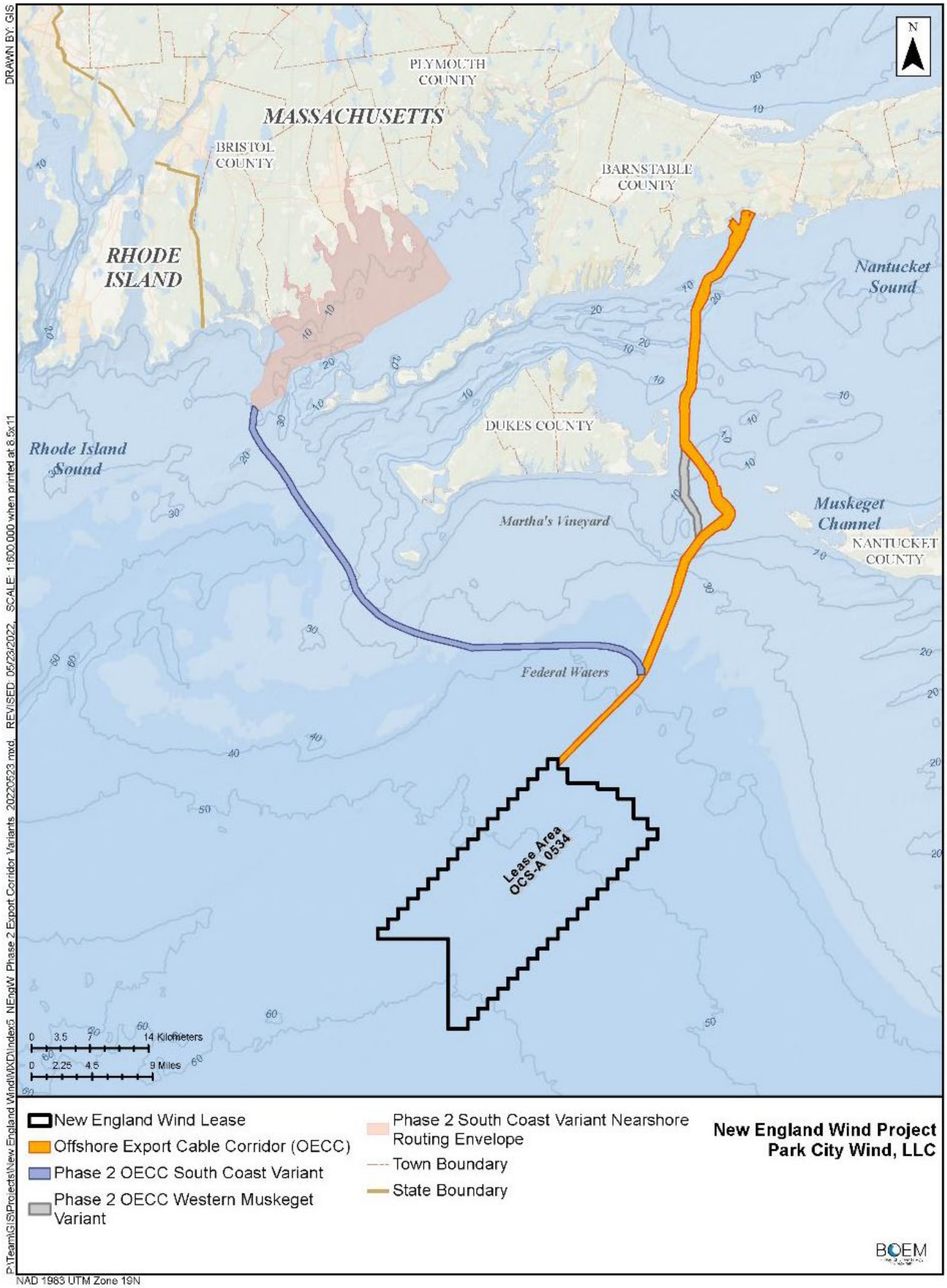
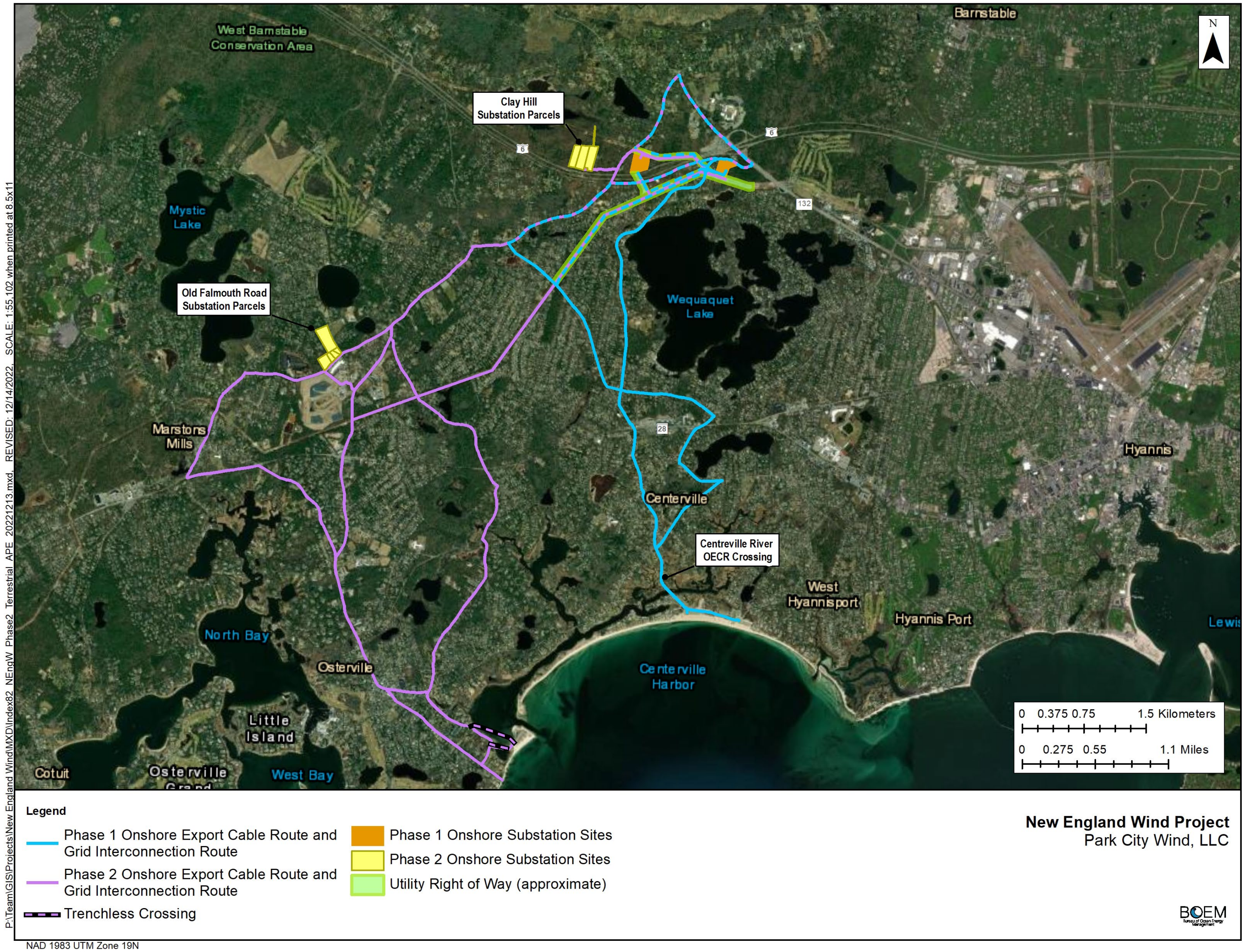


Figure J-4: Marine Area of Potential Effects



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

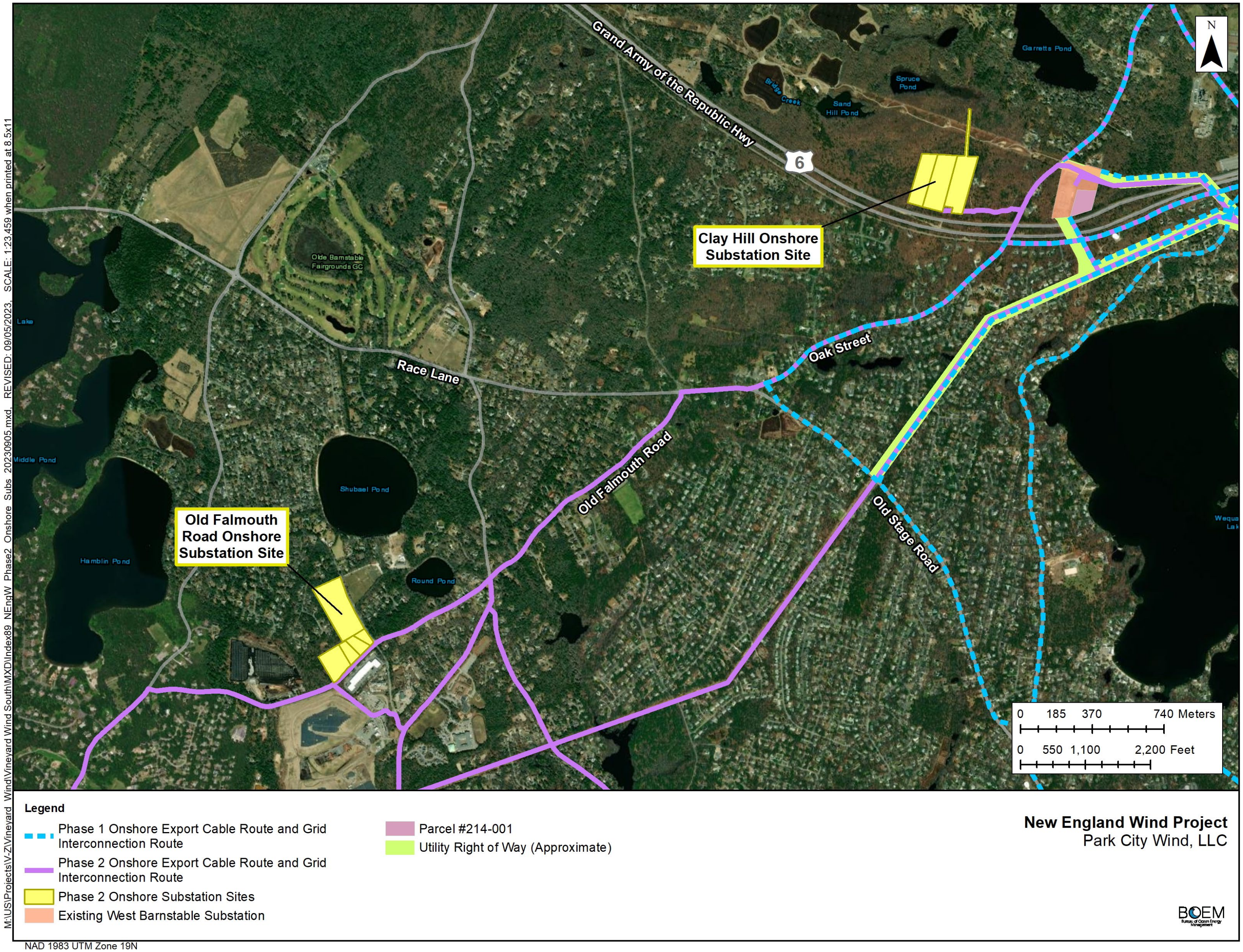


Figure J-7: Terrestrial Area of Potential Effects, West Barnstable Substation Area

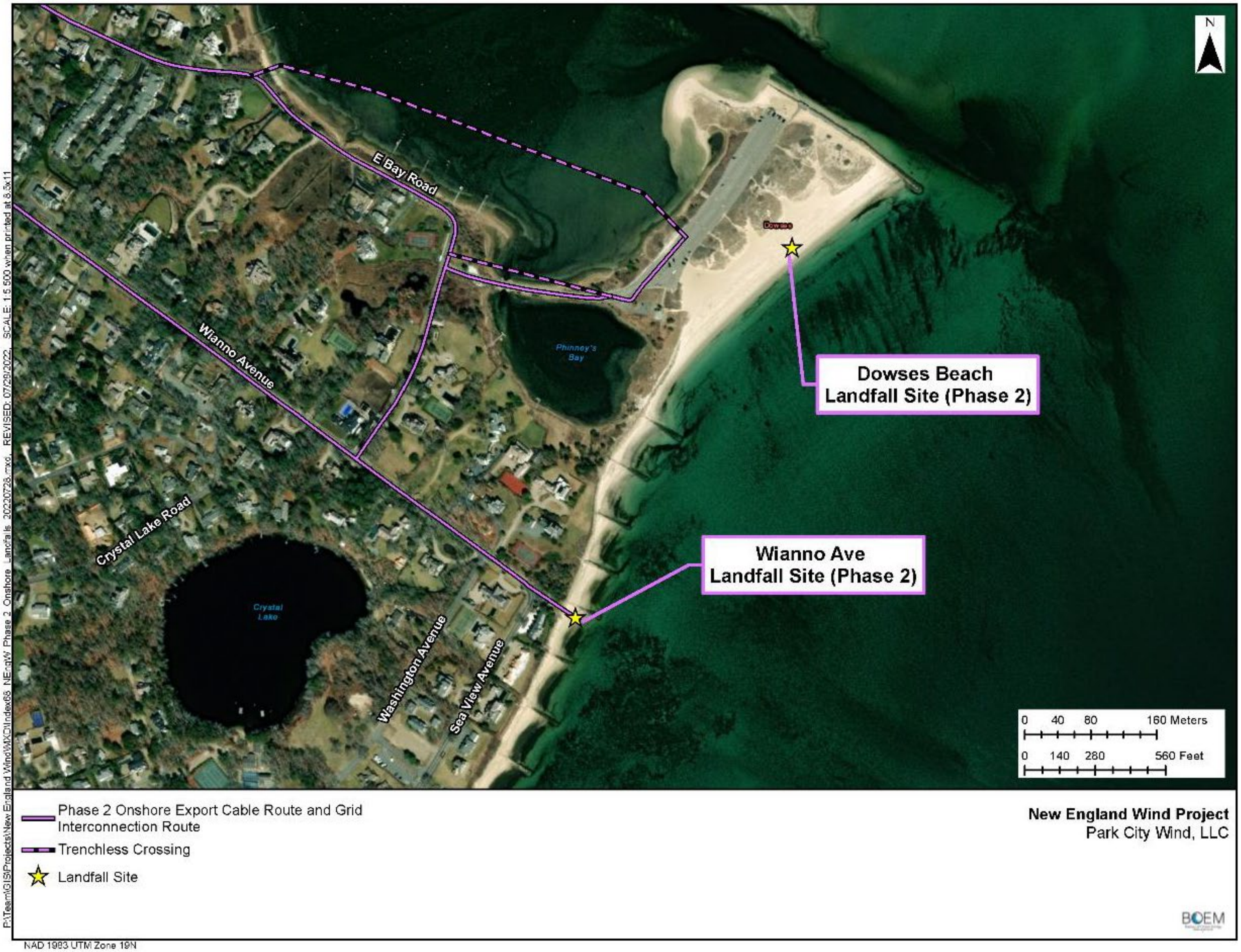


Figure J-8: Terrestrial Area of Potential Effects, Phase 2 Landfall Sites

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 3.3.1.10.2; Epsilon 2023). 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.

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 Clay Hill (preferred site) or Old Falmouth Road[4] (alternate site) onshore substation sites. 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 Clay Hill substation would require 13.6 acres of land disturbance including the removal of a non-historic residence, site grading, and installation of stormwater features (COP Volume I, Section 4.2.2.3; Epsilon 2023). The potential landfall sites at Dowses Beach and Wianno Avenue, one to two OECR and grid interconnection routes, existing West Barnstable Substation,

[4] If the applicant determines that the Old Falmouth Road site is necessary, phased identification and evaluation of historic properties for the remainder of the SCV or the Old Falmouth Road site would be completed at that time, pursuant to 36 CFR § 800.4(b)(2).

and onshore substation at either Clay Hill or Old Falmouth site 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.

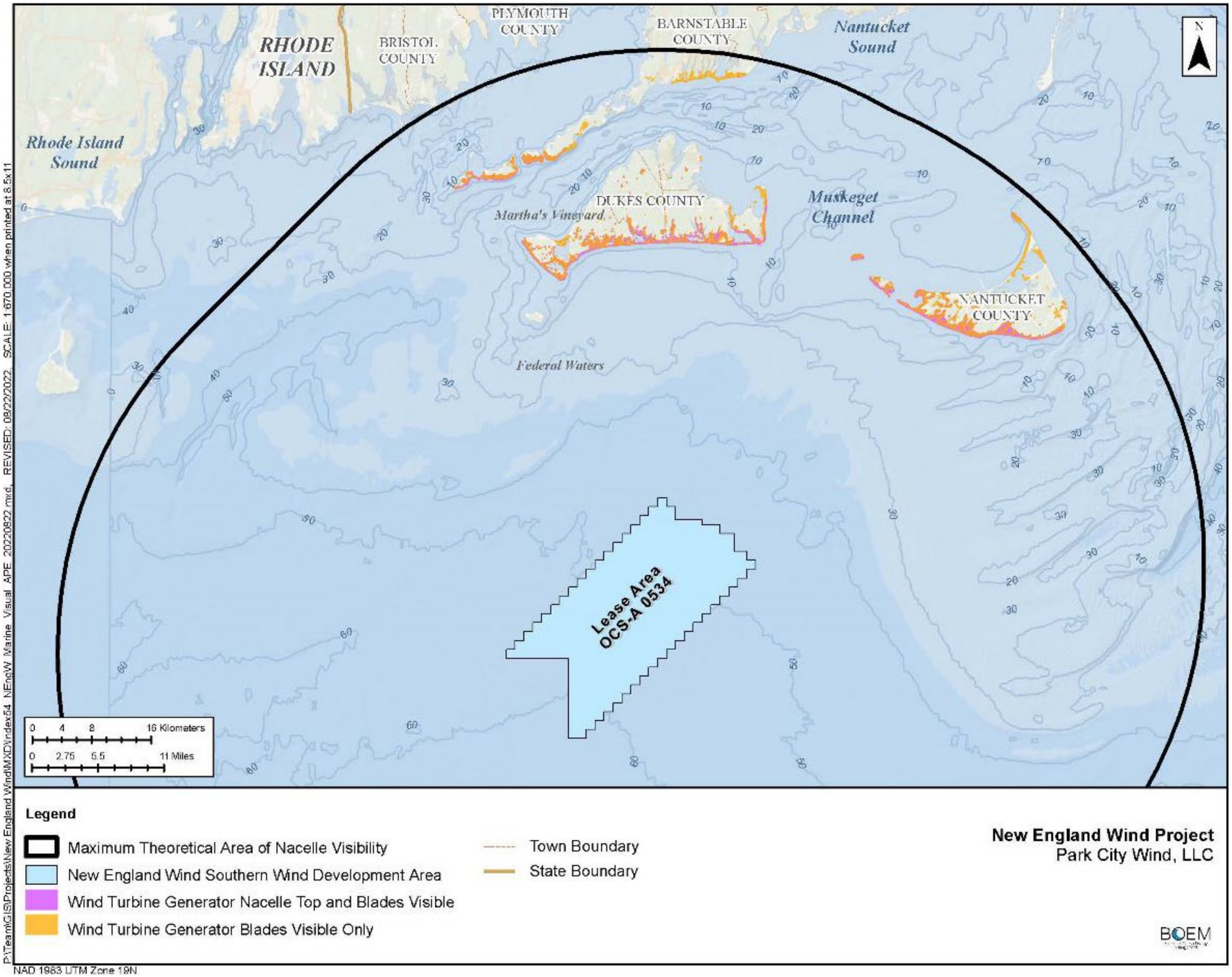


Figure J-9: Offshore Visual Area of Potential Effects

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.

The Phase 2 Clay Hill substation is located along Route 6. The highway and mature vegetation surrounding the site would obscure most views of the substation. Geographic Information System viewshed modeling of the Clay Hill site suggested that within a 0.5-mile buffer surrounding the site, there would be limited visibility of the substation equipment except in select spots along Route 6. A 1,000-foot buffer surrounding the Clay Hill substation has been defined as the visual APE for this portion of the proposed undertaking's footprint.

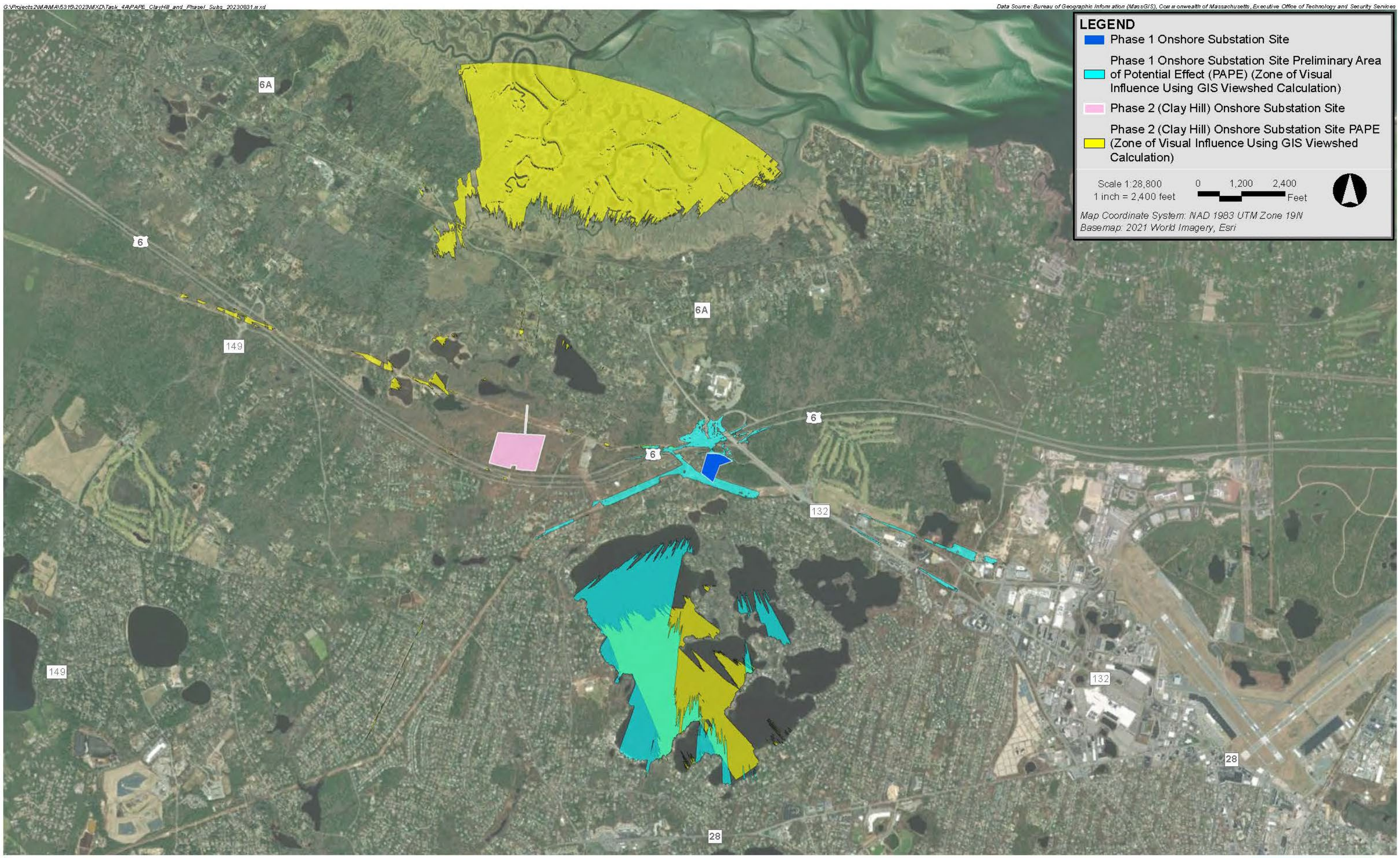


Figure J-10: Onshore Visual Area of Potential Effects, Barnstable Substation Sites

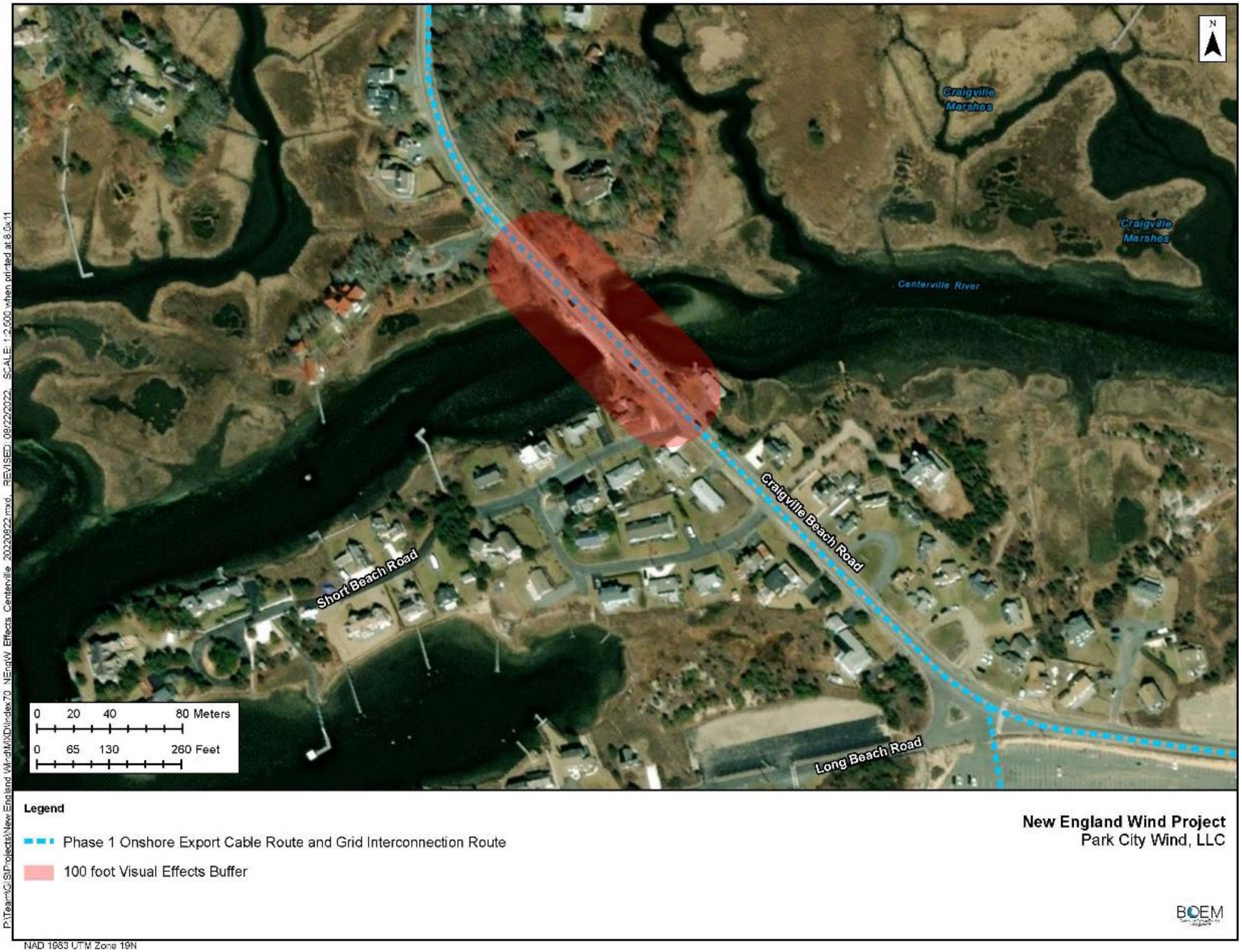


Figure J-11: Onshore Visual Area of Potential Effects, Centerville River Bridge

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 2023)	• 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. • Three potential shipwrecks were identified within the SWDA, which are recommended for avoidance. • 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 2023)	• 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. • Survey activities were conducted over five seasons from 2016 to 2020 (extending to February 2021). • One potential shipwreck was identified within the SWDA, which is recommended for avoidance. • 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 2023)	• 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. • Two potential shipwrecks were identified within the SCV OECC, which are recommended for avoidance. • Seventeen ancient submerged landform features were identified within the SCV OECC. Avoidance is recommended to the extent feasible.
Onshore	Terrestrial Archaeology Reports: Phase 1 Report: Archaeological Reconnaissance Survey, Vineyard Wind 501 South Phase 1 Onshore Development Area, Potential Export Cable Routes and Proposed Substation (June 1, 2020) (COP Appendix III-G; Epsilon 2023)	• The Phase 1 Reconnaissance Report survey was conducted for the potential export cable routes and proposed substation project in the Town of Barnstable. • The study area consisted of the preliminary APE and a 0.5-mile buffer. • 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. • 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. • Small zones of high sensitivity for pre-Contact sites are at the southern end of Long Pond and north shore of Wequaquet Lake. • 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.

Project Area/APE	Studies[a]	Summary of Findings
		• Zones of high sensitivity for post-Contact archaeological resources exist along the export cabling routes near an NRHP-listed property along Phinneys Lane. • 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. • 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 2023)	• The Phase 1 Intensive Archaeological Survey was conducted in the locations of four proposed onshore components in the Town of Barnstable. • 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. • Two pre-Contact find spots and a site were identified and recommended not eligible for NRHP listing. • 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 2023)	• Due diligence study of the Phase 2 OECR and substation envelope was conducted. Portions overlap with Phase 1 potential cable routes. • No NRHP-listed archaeological sites are within the study area. • Forty-two pre-Contact and 15 post-Contact sites have been identified within the study area. • 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. • 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. • 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.
Onshore	Archaeological Reconnaissance Survey New England Wind Phase 2 (Commonwealth Wind)/New England Wind 2 Connector, December 2021, Revised April 2022 (COP Appendix III-G; Epsilon 2023)	• 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. • 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. • Research identified no NRHP-listed archaeological site. Fifteen recorded pre-Contact and 13 post-Contact archaeological sites were identified within the OECR study area. • Of the research identified sites, four pre-Contact, five post-Contact, and one site with pre-Contact, Contact, and post-Contact components may

Project Area/APE	Studies[a]	Summary of Findings
		be located within and/or adjacent to the Phase 2 onshore export cabling route options. • 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. • 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, September 2022 (COP Appendix III-G; Epsilon 2023)	• Due diligence study of the Phase 2 OECR and substation envelope was conducted. Portions overlap with Phase 1 potential cable routes. • No NRHP-listed archaeological sites are within the study area. • Forty-two pre-Contact and 15 post-Contact sites have been identified within the study area. • 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. • 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. • 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.
Onshore	New England Wind Phase 1 and Phase 2 Onshore Cabling Route and Substation New England Wind Offshore Wind Energy Project Procedures Guiding the Discovery of Unanticipated Archaeological Resources and Human Remains, February 2022, revised August 2022 (COP Appendix III-G; Epsilon 2023)	• This included procedures guiding the unanticipated discovery of cultural resources and human remains during the Phase 1 and Phase 2 onshore terrestrial elements of the proposed Project.
Onshore	Technical Memorandum, New England Wind Phase 2/New England Wind 2 Connector Potential Onshore Substation Site Parcel 1 and 2, December 2022 (COP Appendix III-G; Epsilon 2023)	• This included a due diligence study of Parcels 1 and 2 east of the Clay Hill onshore substation site. • No NRHP-listed archaeological sites are within the parcels. • Parcels 1 and 2 are within the Race Lane and Wequaquet Lake section of the proposed Project Phase 2 OECR envelope, which contains recorded pre-Contact and post-Contact sites. • Two pre-Contact and three post-Contact sites have been identified within the study area, defined as a 0.5-mile buffer around the parcels. • Based on the results of the due diligence review and the reconnaissance of the study area, Parcels 1 and 2 contain areas of low to high archaeological sensitivity.
Onshore	Technical Memorandum, New England Wind Phase 2 Potential Onshore Substation Parcel 5 and Additional Phase 2 Onshore Cable Route Segments, March	• This included a due diligence study of Parcel 5 west of the Clay Hill onshore substation and additional Phase 2 OECR segments under consideration. • No NRHP-listed archaeological sites are within the study area. • Parcel 5 and the additional Phase 2 onshore cable route segments are within the Race Lane and Wequaquet Lake section of the proposed Project Phase 2 OECR envelope, which contains recorded pre-Contact and post-Contact sites.

Project Area/APE	Studies[a]	Summary of Findings
	2023 (COP Appendix III-G; Epsilon 2023)	• Two pre-Contact and three post-Contact sites have been identified within the 0.5-mile study area around Parcel 5. • Based on the results of the due diligence review and the reconnaissance of the study area, Parcels 1 and 2 contain areas of high to moderate archaeological sensitivity, with some small zones of low sensitivity near the existing West Barnstable Substation.
Onshore	Technical Report, Intensive (Locational) Archaeological Survey New England Wind Phase 2/ New England Wind 2 Connector Onshore Project Components Proposed Substation December 2022, Revised May 2023 (COP Appendix III-G; Epsilon 2023)	• This included an intensive, locational, archaeological survey of the 20.6-acre proposed Clay Hill onshore substation. • A total of 53 pieces of pre-Contact, period unknown, cultural material were recovered from three sites. • No subsurface archaeological features or diagnostic artifacts were found. • The three sites are recommended as not eligible for listing in the State Register of Historic Places or the NRHP. • No additional archaeological investigations were recommended.
Onshore	2023 Intensive Archeological Surveys for New England Wind Phase 1 and 2 Facilities, July 2023 (COP Appendix III-G; Epsilon 2023)	• This included an intensive archaeological survey of the five proposed Project Phase 1 and 2 facilities. • Pedestrian survey of the five proposed facilities found minimal evidence of prior disturbance. • Two pre-Contact archaeological resources were found in subsurface testing. • Neither find is recommended eligible for listing in the State Register of Historic Places or NRHP. • The five proposed Phase 1 and Phase 2 onshore facilities would not affect any potentially significant archaeological resources; no additional archaeological investigations are recommended.
Visual	New England Wind Visual Impact Assessment (COP Appendix III-H.a; Epsilon 2023)	• 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 2023)	• 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. • 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 correspondence and consultation meetings, BOEM requested information from consulting parties on defining the APE and identifying historic properties that may be potentially affected by the proposed undertaking. BOEM held an initial Section 106 virtual consultation meeting with federally recognized tribes and consulting parties on March 3, 2022, introducing the proposed Project, NEPA substitution in the Section 106 process, the preliminary APE, Section 110(f) consultation requirements, and BOEM's compliance with these requirements. On December 16, 2022, the historic properties assessment/analysis reports (Marine Archaeological Resources Assessment, Terrestrial Archaeological Resources Assessment, Historic Resources Visual Effects Assessment;, and Cumulative Historic Resources Visual Effects Assessment) were distributed to federally recognized tribes and consulting parties. BOEM held a second Section 106 virtual consultation meeting with federally recognized tribes and consulting parties on February 8, 2023, reviewing the historic properties assessments, delineation of the APE, and updated Section 106 schedule. On March 23, 2023, BOEM held a separate second Section 106 virtual consultation meeting with federally recognized tribes who were not able to attend the February 8, 2023, meeting.

On May 26, 2023, BOEM provided the edited Finding of Adverse Effect, Historic Preservation Treatment Plans, and MOA along with comment letters received to date for federally recognized tribes and consulting parties' review with comments requested by June 25, 2023. BOEM held a third Section 106 virtual consultation meeting with federally recognized tribes and consulting parties on June 15, 2023, reviewing the APE summary, Finding of Adverse Effect, proposed Historic Preservation Treatment Plans and mitigations, revised MOA, and the updated Section 106 schedule. On July 18, 2023, BOEM provided the federally recognized tribes and consulting parties a summary of the comments received for the review periods ending February 21, 2023, and June 25, 2023, from consulting parties under the NHPA Section 106 consultation process for the proposed Project and their responses. Meeting summaries and access to recordings of the meetings were made available to consulting parties following each meeting. A fourth Section 106 consultation meeting was held on September 14, 2023 providing consulting parties with updates to the proposed Project, summaries of edits to documents, and opportunities to provide comments on the revised MOA and Historic Preservation Treatment Plans. A fifth Section 106 consultation meeting was held on December 13, 2023, reviewing the Terrestrial Archaeological Resources Assessment addendum updates and revised MOA.

BOEM will continue meeting with consulting parties to take into account the effects of the undertaking on historic properties and to reach resolution of adverse effects through preparation and implementation of a MOA.

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 2023), 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 2023).

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 2023).

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 2023).

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 2023).

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 2023).

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 2023). 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 2023).

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 2023).

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 2023).

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 2023(COP Appendix III-H.b, Section 6.2; Epsilon 2023).

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 2023). 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 2023).

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 2023).

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 2023).

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 2023).

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 2023). 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 2023).

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 2023). 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 2023)

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 2023).

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 2023). 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 2023).

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 2023).

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 2023).

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 2023). 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; Epsilon 2023).

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 for the analysis point of the Gay Head Lighthouse due to its distance of less than 0.2 mile and comparable views of the proposed Project and other offshore wind projects. 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 2023).

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 2023). 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 2023).

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 2023). 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 2023). 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 2023). 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 2023). 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.

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 National Park Service (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.
8. Avoiding known shipwrecks and potentially significant debris fields by no less than 164 feet (50 meters).
9. Providing funding to support the ongoing maintenance of the Gay Head – Aquinnah Shops Area and Edwin Vanderhoop Homestead and Gay Head Lighthouse.
10. Conducting survey of the Chappaquiddick Island TCP and developing a geographic information system database of contributing resources, as well as developing interpretive materials.
11. Funding development of public education materials related to Moshup and Moshup's Bridge, scholarships and fees for professional training or certification in fields related to the TCP, and future planning and implementation of efforts to mitigate the negative impacts of climate change.
12. Conducting additional archaeological investigations of ancient submerged landforms in the SWDA, export cable corridor routes, and the Nantucket Sound TCP.

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 will 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 ROD is potentially issued and the COP is potentially approved. Information pertaining to the Old Falmouth Road onshore substation site added to the proposed Project in August 2023 will also not be available until after the ROD is potentially issued and the COP is potentially approved. If the SCV or Old Falmouth Road site are selected, the applicant will be required to complete surveys 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 federally recognized tribal nations, the Massachusetts SHPO, ACHP, and other identified consulting parties. The SCV and Old Falmouth Road site effects on historic properties would be evaluated in a separate supplemental NEPA analysis.

The MOA will specify the Section 106 consultation process BOEM would conduct in the event either the SCV or Old Falmouth Road site is selected for the final proposed Project design, pursuant to 36 CFR § 800.4(b)(2). If BOEM identifies no additional historic properties or determines that no historic properties are adversely affected due to the selection of one or both of these alternatives, BOEM, with the assistance of the applicant, will notify and consult with the signatories, invited signatories, and consulting parties by providing a written summary of the surveyed area including any maps, a summary of any additional surveys and research conducted to identify historic properties and assess effects, and copies of the surveys. BOEM and the applicant will allow the signatories, invited signatories, and consulting parties 30 calendar days to review and comment on the proposed change, BOEM's determination, and the documents. After the 30-calendar-day review period has concluded and no comments require additional consultation, the applicant will notify the signatories and consulting parties that BOEM has received concurrence from the Massachusetts SHPO regarding the finding of effect and, if any comments are received, provide a summary of the comments and BOEM's responses. BOEM, with the assistance of the applicant, will conduct any consultation meetings if requested by the signatories or consulting parties.

If BOEM determines new adverse effects on historic properties will occur due to the selection of one or both of these alternatives based on the results of the archaeology surveys, BOEM with the assistance of the applicant, 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 the MOA. The applicant will notify all signatories, invited signatories, and consulting parties about the selection of one of these alternatives, the results of the surveys and copies of the surveys, BOEM's determination, and the proposed resolution measures for the adverse effect(s). The signatories, invited signatories, and consulting parties will have 30 calendar days to review and comment on the survey reports, the results of the survey reports, the adverse effect finding, and the proposed resolution of adverse effect(s), including a draft treatment plan(s). BOEM, with the assistance of the applicant, will conduct additional consultation meetings, if necessary, during consultation on the adverse effect finding and during drafting and finalization of the treatment plan(s). BOEM, with the assistance of the applicant, will respond to the comments and make necessary edits to the documents. The applicant 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, the applicant will provide a summary of all the comments received on the documents and BOEM's responses. BOEM, with the assistance of the applicant, will respond to the comments on the draft final documents and make necessary edits to the documents. The applicant will notify all the signatories, invited signatories, and consulting parties 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 it receives any on the draft final documents, 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).

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 ROD under NEPA.

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ATTACHMENT J-1: MEMORANDUM OF AGREEMENT

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MEMORANDUM OF AGREEMENT
AMONG
THE BUREAU OF OCEAN ENERGY MANAGEMENT,
MASHPEE WAMPANOAG TRIBE,
MASHANTUCKET (WESTERN) PEQUOT TRIBAL NATION,
THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT
(LEASE NUMBER OCS-A 0534)

WHEREAS, the Bureau of Ocean Energy Management (BOEM) is considering whether to authorize construction and operation 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 has determined that the Project constitutes an undertaking subject to Section 106 of the National Historic Preservation Act (NHPA), as amended (54 USC § 306108), and its implementing regulations (36 CFR Part 800); and

WHEREAS, BOEM is considering whether to approve with conditions the Construction and Operations Plan (COP) submitted by Park City Wind LLC, hereafter referred to as the Lessee; and

WHEREAS, BOEM has determined that the construction, operation, maintenance, and eventual decommissioning of the Project, planned for up to 130 offshore wind turbine generators (WTGs), up to five electrical service platforms (ESPs; also known as offshore substations), up to three 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), has the potential to adversely affect historic properties as defined under 36 CFR § 800.16(l); and

WHEREAS, the Project consists of two distinct phases, Phase 1 and Phase 2. Phase 1 will occupy 150 to 231 kilometers^2 (km^2) (37,066 – 57,081 acres) of the wind development area and have 41 to 62 WTGs and one or two ESP(s) and Phase 2 will occupy 222 to 303 km^2 (54,857 – 74,873 acres) immediately southwest of Phase 1 and contain 64 to 88 WTG/ESP positions. Two offshore export cables will be installed for Phase 1 and three will be installed for Phase 2, transmitting electricity to landing sites (one for each phase) in the Town of Barnstable, Massachusetts, and then to onshore export cable routes (one for each phase) and one or more substation sites in the Town of Barnstable. Phase 1 and Phase 2 are in the same Area of Potential Effects (APE), and this Memorandum of Agreement (MOA) covers Phase 1 and Phase 2 of the Project; and

WHEREAS, BOEM is preparing an Environmental Impact Statement (EIS) for the Project, pursuant to the National Environmental Policy Act (NEPA; 42 USC § 4321 et seq.) and has elected to use the NEPA substitution process with its Section 106 consultation pursuant to 36 CFR § 800.8(c); and

WHEREAS, following BOEM's issuance of the NEPA Record of Decision (ROD), pursuant to 30 CFR §§ 585.408 – .411, and subject to BOEM's approval, Park City Wind LLC may segregate and assign that portion of the lease Phase 2 occupies to an affiliated legal entity (hereinafter referred to as the assignee), in which case Park City Wind LLC intends to retain Phase 1; and

WHEREAS, if Lease Number OCS-A 0534 is assigned and segregated following issuance of the ROD, BOEM would assign a unique lease number to the new lease, and BOEM would consider the terms of its decision in the ROD to apply to activities of both Lessees and would issue separate letters approving the COP to each Lessee; and

WHEREAS, throughout this document the term 'Tribal Nation' has the same meaning as a federally recognized 'Indian Tribe,' as defined in 36 CFR § 800.16(m); and

WHEREAS, BOEM recognizes its government-to-government obligation to consult with Tribal Nations that may attach religious and cultural significance to historic properties that may be affected by the proposed undertaking; in addition, BOEM will comply with the American Indian Religious Freedom Act (AIRFA), Native American Graves Protection and Repatriation Act (NAGPRA), Executive Orders 13007 and 13175, and the Memorandum of Understanding to Protect Sacred Sites (November 2021); and

WHEREAS, BOEM invited the following federally recognized Tribal Nations to consult on this Project: 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 Indian Tribe, the Shinnecock Indian Nation, and the Wampanoag Tribe of Gay Head (Aquinnah); and

WHEREAS, the Mashpee Wampanoag Tribe of Massachusetts, Mashantucket (Western) Pequot Tribal Nation, and Wampanoag Tribe of Gay Head (Aquinnah) accepted BOEM's invitation to consult and BOEM invited these Tribal Nations to sign this Memorandum of Agreement (MOA) as invited signatories; and

WHEREAS, the Wampanoag Tribe of Gay Head (Aquinnah) participated in Section 106 consultations with BOEM, but after careful internal deliberation, including ongoing review of the Tribes' Indigenous Knowledge as it applies to this and other windfarm projects, stands in opposition to the Project's approval and has declined to sign the MOA; and

WHEREAS, BOEM acknowledges that Tribal Nations possess special expertise in assessing the National Register of Historic Places (NRHP) eligibility of properties with religious and cultural significance to the Tribe(s) pursuant to 36 CFR § 800.4(c)(1); and

WHEREAS, BOEM consulted with Tribal Nations to identify properties of religious and cultural significance to Tribal Nations that may be eligible for listing in the NRHP, including sacred sites, cultural landscapes, and traditional cultural places (TCPs), that may be affected by this undertaking; and

WHEREAS, BOEM consulted with the Mashpee Wampanoag Tribe, Mashantucket (Western) Pequot Tribal Nation, and Wampanoag Tribe of Gay Head (Aquinnah) in government-to-government and technical meetings with Tribal Historic Preservation Officers (THPOs) and BOEM staff regarding potential effects to sites of religious and cultural significance to these Tribal Nations, including the development of this MOA and mitigation measures; and

WHEREAS, the Wampanoag Tribe of Gay Head (Aquinnah) and the Mashpee Wampanoag Tribe identified the Vineyard Sound and Moshup's Bridge TCP as a sacred site with multiple contributing historic properties; and

WHEREAS, BOEM notified in advance the Tribal Nations and the THPOs, the State Historic Preservation Officers (SHPOs) of Massachusetts and Rhode Island, 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). ACHP began involvement through FAST-41, then through NEPA substitution following the June 30, 2021, Notice of Intent, and finally through participation through Section 106; 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, BOEM, in accordance with 35 CRF § 800.3, invited the Rhode Island SHPO to consult on the Project on June 11, 2021, which Rhode Island SHPO accepted on July 15, 2021, before advising on February 21, 2023, that it concluded its participation in Section 106 consultation due to the lack of effects on Rhode Island properties; 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 programmatic agreement (PA) and concluded with No Historic Properties Affected for lease issuance on May 23, 2012, and site assessment approval on May 10, 2018, consistent with the 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 this PA expired on May 12, 2022; and

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 visual portion of the APE (visual 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. The APE is further described in Attachment 1, Area of Potential Effects Maps; and

WHEREAS, BOEM identified eight submerged historic properties and 51 ancient submerged landform features (ASLFs) in the marine APE; no historic properties in the terrestrial APE; and 20 aboveground historic properties (including three TCPs) in the offshore Project components' portion of the visual APE and seven historic properties in the onshore Project components' portion of the visual APE; and

WHEREAS, BOEM identified one National Historic Landmark (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 three aboveground historic properties and one NHL would be subject to visual adverse effects from WTGs; three TCPs would be subject to visual and physical adverse effects; no submerged historic properties would be subject to adverse effects; 49 ASLFs may be 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 MOA will avoid adverse effects on 13 aboveground historic properties in the offshore visual APE, seven historic properties in the onshore visual APE, and eight submerged historic properties and two ASLFs in the marine APE; and

WHEREAS, BOEM determined all the ASLFs identified in the marine APE are eligible for listing in the 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 Channel Groups 18, 19, 20, 32,) and outside (SAL06-19 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 that the visual adverse effect would be cumulative with the potential adverse effects from other reasonably foreseeable offshore wind energy projects; 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 in the NRHP, and that the visual adverse effect would be cumulative with the potential adverse effects from other reasonably foreseeable offshore wind energy projects; and

WHEREAS, the Lessee provided additional information about the South Coast Variant (SCV) route in the U.S. Outer Continental Shelf (i.e., those waters beyond the 3-nautical mile [3.5-mile] limit from shore), including information on marine and terrestrial archaeology resources, as part of a COP supplemental filing in April 2022 (Epsilon 2022). 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 will not be available until after the ROD is issued; and

WHEREAS, if the Lessee chooses to construct the SCV, BOEM would conduct additional analysis of potential effects on historic properties through deferred and phased identification pursuant to 36 CFR § 800.4(b)(2), 36 CFR § 800.5(a)(4), and Stipulation V (Phased Identification); and

WHEREAS, the Lessee identified two potential Phase 2 onshore substations as part of a COP supplemental filing in August 2023 (Epsilon 2023) and provided additional information about one of those sites: Clay Hill. BOEM determined that no historic properties would be affected and consulted with Tribal Nations, Massachusetts SHPO, ACHP, and other consulting parties; and

WHEREAS, information pertaining to identification of historic properties at the second potential site, Old Falmouth Road, will not be available until after the ROD is issued; and

WHEREAS, if the Lessee chooses to utilize the Old Falmouth Road site, BOEM would conduct additional analysis of potential effects on historic properties through deferred and phased identification pursuant to 36 CFR § 800.4(b)(2), 36 CFR § 800.5(a)(4), and Stipulation V (Phased Identification); and

WHEREAS, when the Lessee acquires site control of the select areas of the terrestrial APE in Massachusetts, BOEM will conduct additional analysis of potential effects on historic properties through deferred and phased identification pursuant to 36 CFR § 800.4(b)(2), 36 CFR § 800.5(a)(4), and Stipulation V (Phased Identification); and

WHEREAS, BOEM will conduct Section 106 consultation for the remainder of the SCV, the Old Falmouth Road site, and the select areas of the terrestrial APE with Tribal Nations, Massachusetts SHPO, ACHP, and other consulting parties pursuant to Stipulation V (Phased Identification); and

WHEREAS, the Massachusetts SHPO concurred with BOEM's finding of adverse effect on April 25, 2023; 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 lists of those accepting or declining to participate by either written response or no response to direct invitation are found in Attachment 2, Lists of Invited and Participating Consulting Parties; and

WHEREAS, BOEM has consulted with the Lessee in its capacity as applicant seeking federal approval of its COP, and, because the Lessee 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 waters of the U.S. pursuant to Section 404 of the Clean Water Act (33 USC § 1344), and work and structures in navigable waters of the U.S. and structures from the mean high water mark to the seaward limit of the OCS 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 July 14, 2021), and BOEM invited the USACE to sign this MOA as a concurring party; and

WHEREAS, the Bureau of Safety and Environmental Enforcement (BSEE) designated BOEM as the lead federal agency pursuant to 36 CFR § 800.2(a)(2) to act on its behalf for purposes of compliance with Section 106 for this Project (per electronic communication dated November 21, 2023), and BOEM invited BSEE 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 (Nantucket Historic District) 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 all 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 visual 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 August 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(c)(2)(iii), BOEM invited the Lessee to sign as an invited signatory because the Lessee is assuming a responsibility under the MOA to implement certain stipulations; and

WHEREAS, pursuant to 36 CFR § 800.6, BOEM invited 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, required signatories and invited signatories (hereafter referred to as "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 conducted five consulting party meetings, on March 3, 2022; February 8, 2023; June 15, 2023; September 14, 2023; and December 13, 2023, and conducted an additional consulting party meeting with Tribal Nations on March 23, 2023; and

WHEREAS, BOEM sought and considered the views 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 January 27, February 1, and February 6, 2023; and

WHEREAS, BOEM made the first Draft MOA available to the public for review and comment from December 23, 2022, to February 21, 2023, using BOEM's Project website, and BOEM did receive comments from the public; and

NOW, THEREFORE, BOEM, the Mashpee Wampanoag Tribe, the Mashantucket (Western) Pequot Tribal Nation, the Massachusetts SHPO, and the ACHP agree that the undertaking shall be implemented in accordance with the following stipulations to consider 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 the Lessee, will ensure that the following measures are carried out as conditions of its approval of the undertaking:

I. SEGREGATION AND ASSIGNMENT

A. If that portion of Lease OCS-A 0534 that Phase 2 occupies is segregated and assigned in accordance with 30 CFR §§ 585.408 – 585.411 to an assignee, BOEM will ensure that approval of any activity on future leases includes conditions binding the Lessee to the terms of this MOA as they apply to the segregated and assigned portion of the lease that Phase 2 occupies. BOEM will ensure that the assignee will be bound by the terms of this MOA applicable to Phase 2 of the undertaking, including responsibility for 60 percent of all financial obligations set forth in Attachment 14 to this MOA. The assignee will notify the signatories in writing that it agrees to the terms of this MOA and intends to sign the MOA as an invited signatory.

1. BOEM will consider any necessary amendments to the MOA that result from the segregation of, and assignment of part of the original lease, in accordance with Stipulation XVIII (Amendments). However, an amendment under Stipulation XVIII will not be necessary if BOEM determines the legal entity's participation does not change the undertaking in a manner that would require any modifications to the stipulations set forth in this MOA. In such a case, BOEM will document the segregation and assignment of the lease and the assignee's becoming a signatory to the MOA in a written notification to the signatories and consulting parties and include a copy of the assignee's executed signature page as an invited signatory.

B. Upon lease segregation and assignation of Lease OCS-A 0534 to an assignee, the Lessee (Park City Wind LLC) and this assignee will thereafter together be referred to as "the Lessee" and will both assume and implement all stipulations assigned to the Lessee in this MOA.

II. MEASURES TO AVOID ADVERSE EFFECTS TO 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 COP:

i. The Lessee must avoid the eight potential shipwrecks and potentially significant debris fields identified during marine archaeological surveys. Three potential shipwrecks in the Southern Wind Development Area (SWDA) (PSW-01 – 03) must be avoided by a 50-meter radius buffer from the extent of the site or magnetic field. One potential shipwreck in the OECC (PSW-06) must be avoided by a 100-meter radius buffer from the sonar target boundary. Two potential shipwrecks in the Western Muskeget Variant (PSW-04 and 05) must be avoided by a 50-meter radius buffer from the sonar target boundary. Two potential shipwrecks (PSW-07 and 08) in the SCV, if used, must be avoided by a 60-meter radius buffer from the sonar target boundary. (See Attachment 3, Historic Property Treatment Plan for Submerged Historical Properties.)

ii. The Lessee must avoid two ASLFs (SAL-04 and SAL-05) identified during marine archaeological resource assessments (MARA) for the Project. These two ASLFs are located below the proposed vertical APE and outside the horizontal extents of the WTG work zones.

iii. To demonstrate the avoidance of archaeological sites SAL-04 and SAL-05 (identified in Stipulation II.A.1.ii) and submerged historic properties (identified in Stipulation II.A.1.i), the Lessee must provide as-placed and as-laid maps with both the horizontal and vertical extents of all seafloor impacts. These seafloor impacts may include anchoring activities (location of all anchors, anchor chains, cables, and wire ropes, including sweep but excluding the vertical extent of anchor penetration on the seafloor[1]), cable installation (including trenching depths and seafloor footprint of the installation vessel), and WTG installation (anchoring and spudding/jack-up vessel placement) but excluding the vertical extent of anchor penetration on the seafloor. The as-built or as-laid position plats must be submitted at a scale of 1-in. = 1,000-ft., with Differential Global Positioning System (DGPS) accuracy demonstrating that these seafloor disturbing activities complied with the avoidance criteria applied to the archaeological sites or historic properties established in this MOA. These documents and maps must be submitted to BOEM for consulting parties to review no later than 90 days after completion of all the seafloor disturbing/construction activities.

iv. The Lessee must prepare and submit annual reports to BOEM during construction of the Project that describe implementation of avoidance buffers.

B. Visual APE

1. BOEM will include the following avoidance measure to avoid adverse effects within the visual APE as a condition of approval of the COP:

i. To maintain avoidance of adverse effects on historic properties in the visual APE where BOEM determined there would be no adverse effects or where no effects would occur, the Lessee must 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 Project COP). If the Project is modified, BOEM will follow Stipulation VII (Project Modifications).

III. MEASURES TO MINIMIZE ADVERSE EFFECTS TO IDENTIFIED HISTORIC PROPERTIES

A. Visual APE

1. BOEM has undertaken planning and actions to minimize adverse effects to aboveground historic properties in the visual APE. BOEM will include the following measures to minimize adverse effects within the visual APE as conditions of approval of the COP:

i. The Lessee must use uniform WTG design, speed, height, and rotor diameter to reduce visual contrast and decrease visual clutter.

ii. The Lessee must 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. The Lessee must apply a consistent paint color to 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*

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[1] The sweep of anchor chains, cables or wire ropes will be depicted as two-dimensional "sweep areas," excluding depiction of precise locations where anchor chains, cables, or wire ropes contact the seafloor. The sweep areas must demonstrate avoidance of archaeological sites SAL-04 and SAL-05 and all submerged historic properties.

Renewable Energy Development (April 28, 2021) to help reduce potential visibility of the turbines against the horizon during daylight hours.

iv. The Lessee must equip all WTGs and ESPs with an aircraft detection lighting system (ADLS) 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 an estimated reduction of nighttime visibility of the Project from adversely affected historic properties to less than 13 minutes annually (or less than 0.1 percent of annual nighttime hours). The WTGs and ESPs will be lit and marked in accordance with Federal Aviation Administration and U.S. Coast Guard lighting standards, consistent with BOEM's *Guidelines for Marking of Structures*, to reduce light intrusion.

B. Terrestrial APE

1. BOEM has undertaken planning and actions to minimize adverse effects to historic properties in the terrestrial APE. BOEM will include the following measures to minimize adverse effects within the terrestrial APE as conditions of approval of the COP:

   i. To minimize adverse effects, the Lessee will site the Onshore Export Cable Route (OECR) and grid interconnection cable routes within existing roadways and/or public utility rights-of-way, unless infeasible or impracticable to do so.

2. Where intensive archaeological testing has not occurred, the Lessee must conduct archaeological monitoring of construction activities in the areas of moderate or high archaeological sensitivity in the Phase 1 terrestrial archaeological APE in coordination with Tribal Nations (see Attachment 13, Onshore Archaeological Monitoring Plan).

3. Where intensive archaeological testing has not occurred, the Lessee must 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 (i.e., duct banks, splice vaults) within the identified zone of moderate and high archaeological sensitivity in the Phase 2 terrestrial archaeological APE in coordination with Tribal Nations (see Attachment 13, Onshore Archaeological Monitoring Plan).

IV. MEASURES TO MITIGATE ADVERSE EFFECTS TO IDENTIFIED HISTORIC PROPERTIES

A. Marine APE

1. The Lessee cannot commit to avoiding 49 ASLFs: SAL-06 through SAL-19 in the SWDA; Channel Groups 8-30 (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 resolve the adverse effects to the ASLFs, BOEM will include the following as conditions of approval of the COP and require fulfillment of the following as mitigation measures prior to seafloor disturbing activities in the SWDA or OECC, and if used, in the Western Muskeget Variant or SCV. The Lessee must fund and fulfill mitigation measures in accordance with Attachment 4, Historic Property Treatment Plan for Ancient Submerged Landforms and Features; Attachment 9, Historic Property Treatment Plan for Nantucket Sound TCP; and Attachment 14, Mitigation Funding Options.

   i. Pre-construction Geoarchaeology: The Lessee must 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. This will require the acquisition of additional vibracores within the upper 6 meters (19 feet) of the seabed. The results of this data will be used along with Tribal ecological knowledge and oral histories by the Lessee to develop a detailed description of the landscape at the time of potential occupation. The Lessee will provide reasonable compensation for participating Tribes, if requested by a Tribal Nation. The Lessee's Qualified Marine Archaeologist (QMA) will sample a variety of ASLFs, representing a variety of landforms. The locations and numbers of vibracores taken from the SWDA, OECC, Western Muskeget Variant (if used), and SCV (if used) will be determined based on a review of available geophysical and geotechnical data and with input from consulting Tribal Nations as well as Massachusetts Bureau of Underwater Archaeology (BUAR) and Massachusetts SHPO, if applicable, as described in Attachments 4 and 14 of this MOA. Cores from the OECC will be examined by the QMA at a suitable laboratory facility. The Lessee must invite consulting Tribal Nations to participate during core opening and processing and must provide compensation and travel and per diem costs. If any unanticipated discovery is found during the implementation of this mitigation measure, then BOEM, with the assistance of the Lessee, will follow Stipulation XIV (Post Review Discoveries). The Lessee must complete collection of vibracores prior to commencing seabed disturbing activities within the ASLFs.

a. The Lessee's Pre-construction Geoarchaeology effort must 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 must meet the Secretary of the Interior's (SOI) professional qualification standards for archaeology (62 Fed. Reg. 33,708) and BOEM's standards for Qualified Marine Archaeologists.

b. The Lessee must provide the draft technical report and presentation to the consulting Tribal Nations and, in state waters, Tribal Nations, Massachusetts BUAR, and Massachusetts SHPO, for review. Parties will have the opportunity to consult on the approach and focus of these products prior to the initial draft being completed.

c. The Lessee must notify signatories and Tribal Nations of completion of this measure through annual reporting, per Stipulation XVI (Monitoring and Reporting).

ii. ASLF Post-construction Seafloor Assessment: The Lessee must fulfill commitments for post-construction seafloor assessment via visual inspection survey of impacted, high-potential ASLFs where ground disturbance occurred, as described in Attachment 4. The Lessee, with the assistance of BOEM, will make the final selection of ASLFs in consultation with Tribal Nations.

a. Assessment: The post-construction seafloor assessment will consist of a QMA conducting or overseeing a Remotely Operated Vehicle (ROV) to view the seafloor in areas where previously identified ASLFs exist and where construction activities will permanently disturb the ASLFs and potentially displace material culture. The Lessee must submit the QMA's survey design to BOEM and Tribal Nations for review and comment prior to deployment.

b. Three-Dimensional (3D) Model: The Lessee must develop a 3D model to define the spatial relationship of Project components and installation methodology (e.g. cable installation via trenching or jetting) relative to the ASLFs considered for the post-construction seafloor assessment. The

3D model must identify portions of ASLFs within the vertical APE that will be impacted and that possess a high potential for preserved evidence of human occupation. The Lessee will coordinate with BOEM and Tribal Nations on the results of this effort to select locations for the post-construction seafloor assessment.

c. Documentation: The QMA must document the impacts within 90 days following the installation of any inter-array cables and export cables that impact the previously identified ASLFs selected for the post-construction seafloor assessment. Documentation of the impacted ASLFs must include the use of standard archaeological methodologies.

d. Methods: This inspection must cover not only the immediate physical impacts to the seafloor but also any berms created during trenching or cable installation activities and anchoring activities. These methodologies may include, but are not limited to, establishing a permanent datum, mapping, photo, video, and 3D photogrammetry. For position accuracy, the ROV should be tracked using an Ultra-Short Base Line (USBL) positioning system, where it is feasible.[2]

e. Reporting: In the final report for each of these investigations, the QMA must note the seafloor conditions (visibility), environmental conditions (e.g. sand, mud, shell hash bottom), sea state, and how much time has passed since the construction activities were concluded in the area of the ASLF. The Lessee must produce a series of as-laid or as-placed plats that will show the location of the infrastructure in relation to the ASLF and should include both horizontal and vertical penetration into the ASLF. The maps must also include the location of any sites or artifacts identified because of the visual inspection. If sites are identified on state-owned submerged bottomlands, a copy of the notification to the state, a copy of the site file, and the site trinomial must be provided as part of the final report. The QMA must include all logs and other data associated with the ROV visual inspection of the seafloor.

1) Identification of potential cultural material during the ROV inspection will not constitute a "discovery" nor trigger the reporting and consultation requirements established in Attachment 12, Unanticipated Discoveries Plan for Submerged Archaeological Resources. If human remains, or potential human remains, are identified during the ROV inspections, the Lessee must adhere to the Unanticipated Discoveries Plan for Submerged Archaeological Resources. The Lessee must provide Tribal Nations and BOEM with draft and final technical reports, including 3D models and resulting seafloor impact assessments.

2) The Lessee must notify signatories and Tribal Nations of completion of this measure through annual reporting, per Stipulation XVI (Monitoring and Reporting).

f. Timing: This mitigation measure must be completed no later than 90 calendar days post-final cable burial. If unanticipated issues arise during offshore construction that prevent this measure from being completed within 90 calendar days post-final cable burial, the Lessee must notify

[2] USBL transducers must be placed at least 1 meter (m) below the lowest point on the vessel's hull and cannot be used in water depths less than 5m.

BOEM, propose an alternate completion timeframe, and reach agreement with BOEM on that timeframe.

g. Tribal Monitors: The Lessee must notify Tribal Nations 30 days prior to initiation of the post-construction seafloor assessment and provide them with an opportunity to participate as monitors either via live feed or on the vessel (depending upon vessel space, monitors' offshore safety training and certification, monitors' availability, and health and safety concerns), during the post-construction seafloor inspection of the previously identified ASLFs in the APE (as described above). The Lessee must compensate Tribal Nations for participation in the monitoring activities.

iii. Tribal Focused Mitigation: The Lessee must fulfill commitments to mitigation supporting tribal objectives. Proposed measures consist of a detailed presentation describing the scientific methods and processes undertaken as part of offshore preconstruction surveys and archaeological assessments to document the ASLFs in Nantucket Sound; a digital database comprised of ASLF data analysis and mapping that documents the geographical location and vertical placement of ASLFs; workshops for each participating Tribal Nation to consist of training in the use of GIS and the set up and configuration of GIS software; and an option of having an in-person presentation of the ASLF study results for each Tribal Nation as requested. The final selection and implementation of the measures by the Lessee must be done in consultation with the Tribal Nations.

B. Visual APE

1. BOEM will include the following as conditions of approval of the COP and as mitigation measures to resolve the adverse effects, including direct, indirect, and cumulative effects, on the following historic properties in Massachusetts 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 (including the multiple contributing properties); and
Nantucket Sound TCP.

See Attachment 14 for funding amounts for each mitigation effort, reflecting good faith estimates, based on the experience of qualified consultants with similar activities and comparable historic properties. Tasks associated with the mitigation of visual adverse effects can occur during and/or after Project construction, unless otherwise specified. Mitigation measures under Stipulation III.B must be completed within five years of MOA execution, unless a different timeline is agreed upon by the MA SHPO and accepted by BOEM. The Lessee must fund mitigation measures in accordance with Attachment 14 and pursuant to the following measures.

i. The Lessee must fulfill mitigation measures prior to initiating offshore construction in accordance with Attachment 5, Historic Property Treatment Plan for the Edwin Vanderhoop Homestead and Gay Head – Aquinnah Shops Area. The Lessee must fund (see Attachment 14) and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking:

a. Ongoing Maintenance of Edwin Vanderhoop Homestead and Gay Head – Aquinnah Shops Area: The Lessee must provide funding to support the ongoing maintenance of the Edwin Vanderhoop Homestead and Gay Head – Aquinnah Shops Area, primarily consisting of the upkeep of buildings, structures, pathways, hardscapes, and softscapes in and around the Edwin Vanderhoop Homestead and Aquinnah Shops Area with the goal of protecting these historic properties for future generations.

b. The Lessee must notify signatories and Tribal Nations of completion of this measure through annual reporting, per Stipulation XVI (Monitoring and Reporting).

ii. The Lessee must fulfill mitigation measures prior to initiating offshore construction in accordance with Attachment 6, Historic Property Treatment Plan for Chappaquiddick Island TCP. The Lessee must fund (see Attachment 14) and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking:

a. Survey and GIS Database of Contributing Resources to TCP: The Lessee must 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. The scope of work will include consulting with the Chappaquiddick Tribe of the Wampanoag Nation (Chappaquiddick Wampanoag Tribe, a historical Massachusetts Tribe) and Massachusetts SHPO to define the objectives and scope of work, to develop a Request for Proposals (RFP) and select a consultant, to identify contributing resources that can be made public, and to develop the GIS database and preferred data layers. The identified contributing, non-sensitive properties shall be documented on appropriate Massachusetts Historical Commission (MHC) survey forms.

1) The Lessee must provide the draft MHC survey forms and GIS database to the Chappaquiddick Wampanoag Tribe and MHC for review.

2) All work must be completed by professionals meeting the qualifications specified in the SOI's Professional Qualifications Standards (36 CFR Part 61) and with demonstrated professional experience consulting with Tribal Nations and descendent communities. The GIS work will be developed by professionals with demonstrated experience and will be overseen by a qualified Geographic Information Systems Professional.

b. Development of Interpretive Materials: The Lessee must fulfill commitments to develop and incorporate digital media and interpretive materials, including ArcGIS story maps or other presentations, in conjunction with the GIS database. The scope of work will include consulting with the Chappaquiddick Wampanoag Tribe to define the objectives and scope of work and to develop an RFP and select a consultant. The scope will also include hosting a meeting with the Chappaquiddick Wampanoag Tribe to review selected contributing features to the TCP, preparing and presenting a draft ArcGIS story map, and introducing and training members of the Chappaquiddick Wampanoag Tribe on how the digital media platform functions.

1) The Lessee must provide the draft interpretive materials to the Chappaquiddick Wampanoag Tribefor review.

2) All work must be completed by professionals meeting the qualifications specified in the SOI's Professional Qualifications Standards (36 CFR Part 61) and with demonstrated professional experience consulting with Tribal Nations and descendent communities.

c. The Lessee must notify signatories and Tribal Nations of completion of this measure through annual reporting, per Stipulation XVI (Monitoring and Reporting).

iii. The Lessee must fulfill mitigation measures prior to initiating offshore construction in accordance with Attachment 7, Historic Property Treatment Plan for Gay Head Lighthouse. The Lessee must fund (see Attachment 14) and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking:

a. Ongoing Maintenance: The Lessee must fulfill commitments to provide funding to 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. The Lessee must fulfill mitigation measures prior to initiating offshore construction in accordance with Attachment 8, Historic Property Treatment Plan for Vineyard Sound and Moshup's Bridge TCP. The Lessee must fund (see Attachment 14) and commence at least one of the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking:

a. Scholarships and Training for Tribal Resource and/or Environmental Stewardship: The Lessee must fulfill commitments to fund scholarships and fees for professional training or certification in fields related to the TCP. 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.

b. Coastal Resilience and Habitat Restoration: The Lessee must fulfill commitments to fund future planning and implementation of efforts to help mitigate negative impacts of climate change.

v. The Lessee must fulfill mitigation measures prior to seafloor disturbing activities in the SWDA or OECC, and if used, in the Western Muskeget Variant or SCV in accordance with Attachment 9, Historic Property Treatment Plan for Nantucket Sound TCP. The Lessee must fund (see Attachment 14) and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking:

a. Nineteen of the adversely affected ASLFs in the Project OECC and Western Muskeget Variant are potential contributors to the Nantucket Sound TCP. The Lessee must fulfill commitments to additional archaeological investigation described above in Stipulation IV.A.1 and in Attachment 4, Historic Property Treatment Plan for Ancient Submerged Landforms and Features.

V. PHASED IDENTIFICATION

A. BOEM will defer and phase the identification of historic properties, assessment of effects, and resolution of adverse effects within select areas of the terrestrial APE in Massachusetts (depicted in Figure 1.1-2 in Attachment 10, New England Wind Phased Identification Plan), the SCV, and the Phase 2 Old Falmouth Road substation site pursuant to 36 CFR §§ 800.4(b)(2) and 800.5(a)(4). BOEM determined deferred and phased identification was necessary for those select areas of the terrestrial APE where the Lessee does not yet have site control and for the SCV and the Phase 2 Old Falmouth Road substation site if the Lessee selects those alternatives. The final identification of historic properties, assessment of effects, and resolution of adverse effects within the select areas of the terrestrial APE, SCV, and the Phase 2 Old Falmouth Road onshore substation will occur after the Final EIS and ROD. The following measures will be implemented.

1. BOEM, with the assistance of the Lessee, will invite any additional consulting parties that may want to consult on this phased identification based on any new information regarding the specific location of the SCV or the selection of the Phase 2 Old Falmouth Road onshore substation or if the Lessee secures site control to the selected areas within the terrestrial APE.
2. The Lessee must conduct the phased identification of historic properties within the marine, terrestrial, and visual portions of the APE, as applicable, in accordance with state guidelines, BOEM's most recent *Guidelines for Providing Archaeological and Historic Property Information Pursuant to Title 30 Code of Federal Regulations Part 585*, and consistent with Attachment 10, New England Wind Phased Identification Plan. The Lessee must coordinate with the consulting Tribal Nations, Massachusetts SHPO, and consulting parties prior to the initiation of any such identification efforts.
   i. BOEM will delineate any marine, terrestrial, and visual portions of the APE for the SCV, if selected.
   ii. BOEM will delineate the terrestrial and visual portions of the APE for the Phase 2 Old Falmouth Road onshore substation, if selected.
   iii. BOEM requires that the Lessee complete identification efforts and document those efforts in technical reports that address the identification of historic properties and sites of religious and cultural significance and include an evaluation of effects applying the criteria of adverse effect pursuant to 36 CFR § 800.5(a).
3. BOEM will consult with Tribal Nations, Massachusetts SHPO, the ACHP, and consulting parties on the results of historic property identification surveys that were not addressed prior to the execution of this MOA.
4. BOEM will treat all identified potential historic properties as eligible for inclusion in the NRHP unless BOEM determines, and the Massachusetts SHPO concurs, 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 as a result of this deferred and phased identification, BOEM, with the assistance of the Lessee, will notify and consult with the signatories and consulting parties following the consultation process set forth here in this stipulation.
   i. BOEM, with the assistance of the Lessee, will notify all the signatories and consulting parties about the surveys of portions of the terrestrial APE, the SCV, or the Phase 2 Old Falmouth Road onshore substation and BOEM's determination by providing a written summary of the surveys 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. BOEM, with the assistance of the Lessee, will provide Tribal Nations, the Massachusetts SHPO, the ACHP, and consulting parties with 60 calendar days to review and comment on the survey reports, the results of the surveys, BOEM's determination, and the documents.

iii. After the 60-calendar day review period has concluded and if no comments require additional consultation, BOEM, with the assistance of the Lessee, will notify the signatories and consulting parties that the Massachusetts SHPO has concurred with BOEM's determination. If comments are received, the Lessee will provide a summary of comments and BOEM's responses to signatories and consulting parties.

iv. BOEM, with the assistance of the Lessee, will conduct any consultation meetings if requested by the signatories or consulting parties during this 60-calendar day review period.

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 the Lessee, will notify and consult with the signatories and consulting parties regarding BOEM's finding. BOEM will determine through consultation with the signatories and consulting parties and the Lessee measures for avoidance, minimization, and mitigation in order to resolve adverse effects following the consultation process set forth in this stipulation.

i. BOEM, with the assistance of the Lessee, will notify all signatories and consulting parties about the surveys and BOEM's determination by providing a written summary of the results 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 and consulting parties will have 60 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 the Lessee, will conduct a consultation meeting during this 60-calendar review period and conduct any additional consultation meetings as necessary or requested.

iv. BOEM, with the assistance of the Lessee, will respond to the comments and make necessary edits to the documents.

v. BOEM, with the assistance of the Lessee, will send the revised draft final documents to the 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, BOEM, with the assistance of the Lessee, will provide a summary of all the comments received on the documents and BOEM's responses.

vi. BOEM, with the assistance of the Lessee, will respond to the comments on the draft final documents and make necessary edits to the documents.

vii. BOEM, with the assistance of the Lessee, will notify all signatories and consulting parties and provide the final document(s), including the final treatment plan(s) and a summary of comments and BOEM's responses thereto, if BOEM receives any comments on the draft final documents, 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).

viii. The Lessee must implement the final measures to resolve adverse effects per the final treatment plan(s) as applicable and based on consultation.

ix. The MOA will not need to be amended after the treatment plan(s) is accepted by BOEM.

7. If the SHPO disagrees with BOEM's determination regarding whether an affected property is eligible for inclusion in the NRHP, or if the ACHP or the SOI so request, the agency official will obtain a determination of eligibility from the SOI pursuant to 36 CFR Part 63 (36 CFR § 800.4(c)(2)).
8. If a Tribal Nation that attaches religious and cultural significance to a property off tribal lands does not agree, it may ask the ACHP to request the agency official to obtain a determination of eligibility pursuant to 36 CFR Part 63 (36 CFR § 800.4(c)(2))
9. If any of the consulting parties object to the findings or resolutions made pursuant to these measures, BOEM will resolve any such objections pursuant to the dispute resolution process set forth in Stipulation XVII, Dispute Resolution.

VI. REVIEW PROCESS FOR DOCUMENTS

A. The following process will be used for as-placed and as-laid maps (Stipulation II.A.1.iii) and technical reports (Stipulations IV.A.1.i.b; IV.A.1.ii.e; IV.B.1.ii.b; and V.A.5 and 6) produced in accordance with the Stipulations of this MOA:

1. Draft Document
   - i. The Lessee must provide the document to BOEM for technical review and approval.
     - a. BOEM will have 15 calendar days to complete their technical review.
     - b. If BOEM does not provide approval, they will submit comments back to the Lessee, who will have 15 calendar days to address the comments.
   - ii. After BOEM has reviewed and approved the document, BOEM, with the assistance of the Lessee, will provide the draft document to the signatories and consulting parties, except the ACHP, for review and comment.
     - a. Consulting parties will have 30 calendar days, or another time frame agreed upon by the signatories and consulting parties, to review and comment.
     - b. BOEM, with the assistance of the Lessee, will coordinate a meeting with consulting parties to facilitate comments on the document if requested by a consulting party.
     - c. BOEM will consolidate comments received and provide them to the Lessee within 15 calendar days of receiving comments from consulting parties.
     - d. BOEM, with the assistance of the Lessee, will respond to the comments and make necessary edits to the documents.
   - iii. If BOEM requires substantial edits to the draft document, the Lessee must make those revisions and resubmit the document as a draft for revision under Stipulation VIII.A.1 (Submission of Documents).
2. Draft Final Document
   - i. The Lessee must provide BOEM with the draft final document for technical review and approval.
     - a. BOEM will have 15 calendar days to complete their technical review.
     - b. If BOEM does not provide approval, they will submit comments back to the Lessee, who will have 15 calendar days to address the comments.
   - ii. BOEM, with the assistance of the Lessee, will provide the final draft document to the signatories and consulting parties, except the ACHP, for review and comment. With this same submittal of draft final documents, BOEM, with the

assistance of the Lessee, will provide a summary of all comments received on the documents and BOEM's responses.

a. Signatories and consulting parties will have 30 calendar days, or another time frame agreed upon by the signatories and consulting parties, to review and comment.

b. BOEM, with the assistance of the Lessee, will coordinate a meeting with signatories and consulting parties to facilitate comments on the document if requested by a consulting party.

c. BOEM will consolidate comments received and provide them to the Lessee within 15 calendar days of receiving comments from consulting parties.

d. BOEM, with the assistance of the Lessee, will respond to the comments and make necessary edits to the documents.

3. Final Document

i. The Lessee must provide BOEM with the final document for approval.

a. BOEM will have 15 calendar days to complete their technical review.

b. If BOEM does not provide approval, they will submit comments back to the Lessee, who will have 15 calendar days to address the comments.

c. BOEM, with the assistance of the Lessee, will provide the final document to signatories and consulting parties, except the ACHP, within 30 calendar days of approving the final document. With this same submittal of final documents, the Lessee must provide a summary of all the comments received on the documents and BOEM's responses.

VII. PROJECT MODIFICATIONS

A. If the Lessee 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 would change BOEM's final Section 106 determinations and findings for this Project, the Lessee must notify and provide BOEM with information concerning the proposed modifications. The Lessee must not proceed with the proposed modifications until the following process under Stipulation VII.A is concluded. BOEM will determine if these modifications require alteration of the conclusions reached in the Finding of Effect and, thus, require additional consultation with the signatories and consulting parties. If BOEM determines additional consultation is required, the Lessee must provide the signatories and consulting parties with the information concerning the proposed changes, and the signatories and consulting parties will have 30 calendar days from receipt of this information to comment on the proposed changes. BOEM will consider any comments from signatories and consulting parties prior to agreeing to any proposed changes. Using the procedure below, BOEM will, as necessary, consult with the 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. Any project modification followed pursuant to Stipulation VII (Project Modifications) would not require an amendment to the MOA.

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 the Lessee, will notify and consult with the signatories and consulting parties following the consultation process set forth in this Stipulation VII.A.1.

i. The Lessee must notify all signatories and consulting parties about this proposed change and BOEM's determination by providing a written summary of the Project modification including any maps, a summary of any additional surveys and/or research conducted to identify historic properties and assess effects, and copies of the surveys.

ii. BOEM and the Lessee will provide the signatories and consulting parties with 30 calendar days to review and comment on the proposed change, BOEM's finding, and the documents.

iii. After the 30-day calendar review period has concluded and no comments require additional consultation, the Lessee must notify the signatories and consulting parties that BOEM has approved the Project modification and, if the Lessee received any comments, provide a summary of the comments and BOEM's responses.

iv. BOEM, with the assistance of the Lessee, 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 the Lessee, will notify and consult with the 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 VII.A.2.

i. The Lessee must notify all signatories and consulting parties about this proposed modification, BOEM's determination, and the proposed resolution measures for the adverse effect(s).

ii. The 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 the Lessee, 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 the Lessee, will respond to comments and make necessary edits to the documents.

v. The Lessee must send the revised draft final documents to the signatories and consulting parties for review and comment during a 30-calendar day review and comment period. With the submittal of draft final documents, the Lessee will provide a summary of all the comments received on the documents and BOEM's responses.

vi. BOEM, with the assistance of the Lessee, 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 SHPOs on the finding of new adverse effect(s), BOEM has accepted the final treatment plan(s), and BOEM has approved the Project modification, the Lessee must notify all signatories and consulting parties that BOEM has approved the Project modification. The Lessee must provide the final document(s) including the final treatment plan(s) and a summary of comments and BOEM's responses thereto, if BOEM receives any comments 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 or consulting parties object to determinations, findings, or resolutions made pursuant to these measures (Stipulation VII.A.1 and VII.A.2), BOEM

will resolve any such objections pursuant to the dispute resolution process set forth in Stipulation XVIII, Amendments.

VIII. SUBMISSION OF DOCUMENTS

A. Tribal Nations, ACHP, NPS, and consulting parties

1. All submittals to Tribal Nations, ACHP, NPS, 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.

IX. CURATION

A. BOEM, with the assistance of the Lessee, will ensure that for 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 Part 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. Other provisions may include curating materials of Native American heritage with Tribal Nations. No excavation is allowed to be initiated before acceptance and approval of a curation plan. The curation plan must be developed through consultation with the Tribal Nations, agencies, and property owners and finalized within one year after completion of the associated construction activities.
   i. In the event artifacts and material culture associated with the Pre-Contact periods within the coastal and marine environments are identified and recovered during pre-construction, construction, operation, maintenance, and decommissioning of the proposed Project under this MOA, including for mitigation or resulting from post-review discovery including but not limited to vibracore sampling, those materials, if they are not replaced on the seafloor, will be housed at a curatorial facility in consultation with the Tribal Nations. These collection and curation directions do not apply to the post-construction seafloor inspection mitigation.
2. If suspected human remains are encountered, the Lessee must comply with the Advisory Council on Historic Preservation's (ACHP) *Policy Statement on Burial Sites, Human Remains, and Funerary Objects* (March 2023).

B. BOEM, with the assistance of the Lessee, will ensure that for 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 acceptable to the Massachusetts SHPO, or an approved and certified repository, in accordance with the standards and guidelines required by the Massachusetts SHPO. Curating materials of Native American heritage with Tribal

Nations should be considered as an acceptable option. Lands as described here may include the seafloor in state waters. No excavation is allowed to be initiated before acceptance and approval of a curation plan. The curation plan will be developed through consultation with the Tribal Nations, agencies, and property owners and finalized within one year after completion of the associated construction activities.

i. In the event artifacts and material culture associated with the Pre-Contact periods within the coastal and marine environments are identified and recovered from state property during pre-construction, construction, operation, maintenance, and decommissioning of the proposed Project under this MOA, including for mitigation or resulting from post-review discovery including but not limited to vibracore sampling, those materials, if they are not replaced on the seafloor, may be housed at a curatorial facility in consultation with the Tribal Nations and SHPO and local government(s). These collection and curation directions do not apply to the post-construction seafloor inspection mitigation.

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 the Lessee, in coordination with the SHPO and affected Tribal Nation(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, the Lessee must seek to have the materials donated to the repository identified under Stipulation IX.B.1 through a written donation agreement developed in consultation with the consulting parties. BOEM, assisted by the Lessee, 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 the Lessee will ensure that recovered artifacts and related documentation are curated in a suitable repository as agreed to by BOEM, Massachusetts SHPO, and affected Tribal Nation(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 Part 79. No excavation is allowed to be initiated before acceptance and approval of a curation plan.

3. If suspected human remains are encountered, the Lessee must comply with the ACHP's *Policy Statement on Burial Sites, Human Remains, and Funerary Objects (March 2023)* and Attachments 11 and 12.

X. EXPERTISE AND QUALIFICATIONS

A. <u>SOI Standards for Archaeology and Historic Preservation.</u> The Lessee must 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. 44,716, September 29, 1983), and considers the suggested approaches to new construction in the SOI's Standards for Rehabilitation.

B. <u>SOI Professional Qualification Standards.</u> The Lessee must 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. 44,738–44,739). A "qualified professional" is a person who meets the relevant standards outlined in such SOI's standards. The Lessee must provide documentation to BOEM demonstrating that the consultants retained for services pursuant to this MOA meet these standards prior to the implementation of mitigation measures.

C. <u>Tribal Consultation Experience.</u> BOEM, with the assistance of the Lessee, will ensure that all work carried out pursuant to this MOA that requires consultation with Tribal Nations is performed by professionals who have demonstrated professional experience consulting with federally recognized Tribal Nations.

D. Investigations of ASLFs. The Lessee must ensure that the additional investigations of ASLFs will be conducted, and the reports and other materials are produced by one or more qualified marine archaeologists and geological specialists who meet the *Secretary of the Interior's Professional Qualifications Standards* and have 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.

E. BOEM Acknowledgement of the Special Expertise of Tribal Nations. BOEM recognizes that all tribal participants and knowledge need not conform to the SOI's standards and acknowledges that Tribal Nations possess special expertise in assessing the eligibility of historic properties that may possess religious and cultural significance to Tribal Nations, pursuant to 36 CFR § 800.4(c)(1). To further apply this expertise, BOEM, with the assistance of the Lessee, will incorporate indigenous knowledge and indigenous traditional ecological knowledge (ITEK) into the documents and review processes when such knowledge is received from Tribal Nations in consultation and during implementation of the MOA, consistent with the Office of Science and Technology Policy and Council on Environmental Quality memorandums (Executive Branch policy) on ITEK and federal decision making (November 15, 2021), "Guidance for Federal Departments and Agencies on Indigenous Knowledge" (November 30, 2022), and "301 DM 7 Departmental Responsibilities for Consideration and Inclusion of Indigenous Knowledge in Department Actions and Scientific Research" (December 5, 2023). Tribal Nations will also be afforded the opportunity to review the application of their knowledge in documents produced under the MOA pursuant to Stipulation VIII (Submission of Documents).

XI. DURATION

A. This MOA will expire at (1) the decommissioning of the Project in the lease area, as defined in the lease with BOEM (Lease Number OCS-A 0534) or (2) 33 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 XVIII (Amendments).

XII. VIBRATION MONITORING

A. The Lessee must comply with local conditions to minimize vibration impacts during installation of select portions of the Phase 1 onshore cable route duct bank, including that portion in the Centerville Historic District. These conditions will be specified in the Cape Cod Commission's Development of Regional Impact Review approval and may include limiting use of vibratory construction methods and performing pre- and post-construction surveys, if requested by property owners.

XIII. TERRESTRIAL ARCHAEOLOGICAL MONITORING

A. Implementation of Terrestrial Archaeological Monitoring Plan. The Lessee must implement the archaeological monitoring plan found in Attachment 13, Onshore Archaeological Monitoring Plan, which applies to areas designated as having high or moderate sensitivity where intensive archaeological testing has not occurred and identified for archaeological monitoring.

B. In the event of a post-review discovery during archaeological monitoring, the process identified under Stipulation XIV (Post-Review Discoveries) applies.

XIV. POST-REVIEW DISCOVERIES

A. Implementation of Post-Review Discovery Plans: If historic properties are discovered that may be historically significant or unanticipated effects on historic properties are found, BOEM and BSEE, with the assistance of the Lessee, 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 historic property or unanticipated effects to a historic property prior to or during construction, operation and maintenance, or decommissioning of the Project, the Lessee must implement the following actions, which are consistent with the post-review discovery plans (Attachments 11 and 12):

1. Immediately halt all ground- or seafloor-disturbing activities within the area of discovery in accordance with all safety procedures and emergency shut down protocols while considering whether stabilization and further protections are warranted to keep the discovered resource from further degradation or impact.
2. Notify BOEM and BSEE simultaneously in writing via report within 72 hours of the discovery.
3. Keep the location of the discovery confidential and take no action that may adversely affect the discovered property until BOEM or the archaeologist or QMA (as described in Attachments 11 and 12) has made an evaluation and instructed the Lessee on how to proceed.
4. Conduct any additional investigations as directed by BOEM or the archaeologist or QMA to determine, in consultation with the Massachusetts SHPO and applicable federally recognized Tribal Nations, if the resource is eligible for listing in the NRHP (30 CFR § 585.702(b)). BOEM will also be notified about the transmittal of information on the archaeological site to SHPO. BOEM will direct the Lessee to complete additional investigations, as BOEM deems appropriate, if:
   i. The site has been impacted by the Project activities; or
   ii. Effects on the site from the Project activities cannot be avoided.
5. If investigations indicate that the resource is eligible for listing in the NRHP, BOEM, with the assistance of the Lessee, will work with the other relevant signatories and consulting parties to this MOA who have a demonstrated interest in the affected historic property 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 burial site, the Lessee, notwithstanding provision XIII.B.3, will contact the Tribal Nations as identified in the notification lists included in the post-review discovery plans within 72 hours of the discovery with details of what is known about the discovery and consult with the Tribal Nations pursuant to the post-review discovery plan.
7. If BOEM incurs costs in addressing the discovery, under Section 110(g) of the NHPA, BOEM may charge the Lessee reasonable costs for carrying out historic preservation responsibilities, pursuant to its delegated authority under the OCS Lands Act (30 CFR § 585.702 (c)-(d)).

XV. EMERGENCY SITUATIONS

A. In the event of an emergency or disaster that is declared by the President or the Governor of Massachusetts, which represents an imminent threat to public health or safety or creates a hazardous condition due to impacts from this Project's infrastructure damaged during the emergency and affecting historic properties in the APEs, the Lessee must notify BOEM. BOEM will then, with the assistance of the Lessee, notify the consulting Tribal Nations, Massachusetts SHPO, and the ACHP of the condition that has initiated the situation and the measures taken to respond to the emergency or hazardous condition. BOEM will make this notification as soon as reasonably possible but not later than 48 hours from when it becomes aware of the emergency or disaster. Should the consulting Tribal Nations, Massachusetts SHPO, or the ACHP desire to provide technical assistance to BOEM, they will submit comments within seven calendar days from notification if the nature of the emergency or hazardous condition allows for such coordination.

XVI. MONITORING AND REPORTING

A. By July 31 of each calendar year following the execution of this MOA until it expires or is terminated, the Lessee must prepare and, following BOEM's review and agreement to share this summary report, provide all 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 II and III) were implemented, any scheduling changes proposed, any problems encountered, and any disputes and objections received in BOEM's efforts to carry out the terms of this MOA. The Lessee can satisfy its reporting requirement under this stipulation by providing the relevant portions of the annual compliance certification required under 30 CFR § 285.633. If requested by the signatories, BOEM will convene an annual meeting with the other signatories and consulting parties to discuss the annual report, the implementation of this MOA, and other related requested topics.

XVII. DISPUTE RESOLUTION

A. If any signatory or consulting party to this MOA objects to any actions proposed or the manner in which the terms of this MOA are implemented, they must notify BOEM in writing of their objection. BOEM will consult with such party, and potentially with other interested parties, to resolve the objection. If BOEM determines that such objection cannot be resolved, BOEM will:

1. Forward all documentation relevant to the dispute, including BOEM's proposed resolution, to the ACHP, requesting that the ACHP 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 considers any timely advice or comments regarding the dispute from the ACHP, signatories and/or consulting parties, and provide each of them with a copy of the written response. BOEM will then make its final decision and proceed accordingly.
2. Make a final decision on the dispute and proceed accordingly if ACHP does not provide its advice regarding the dispute within the 30-calendar day time period. Prior to reaching such a final decision, BOEM will prepare a written response that considers any timely comments regarding the dispute from the signatories, invited signatories, and/or consulting parties to the MOA and provide each of them and the ACHP with a copy of such written response.

B. BOEM's and the Lessee'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 must notify BOEM. BOEM will review the objection and may notify the other signatories as appropriate and respond to the objector.

XVIII. AMENDMENTS

A. This MOA may be amended when such an amendment is agreed to in writing by all signatories. The amendment will be effective on the date a copy signed by the signatories is filed with the ACHP.

B. Revisions to any attachment may be proposed by any signatory by submitting a draft of the proposed revisions to all signatories with a notification to the consulting parties. The signatories will consult for 30 calendar days (or another time period agreed upon by all signatories) to consider the proposed revisions to the attachment. If the signatories unanimously agree to revise the attachment, BOEM will provide a copy of the revised attachment to the other signatories and consulting parties. Revisions to any attachment to this MOA will not require an amendment to the MOA.

XIX. COORDINATION WITH OTHER FEDERAL AGENCIES

A. If 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 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 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 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 XVIII (Amendments).

B. If the signatories approve the Federal agency's request to be a signing party to this MOA, an amendment under Stipulation XVIII 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 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.

XX. TERMINATION

A. If any signatory to this MOA determines that its terms will not or cannot be carried out, that party will immediately consult with the other signatories and consulting parties to attempt to develop an amendment per Stipulation XVIII. If within 30-calendar days (or another time period agreed to by all signatories) an amendment cannot be reached, any signatory may terminate the MOA upon written notification to the other signatories.

B. Once the MOA is terminated, and prior to work continuing on the undertaking, BOEM will either (a) execute a new 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 as to the course of action it will pursue.

XXI. ANTI-DEFICIENCY ACT

A. BOEM's obligations under this Memorandum of Agreement are subject to the availability of appropriated funds, and the stipulations of this MOA are subject to the provisions of the Anti-Deficiency Act. BOEM shall make reasonable and good faith efforts to secure the necessary funds to implement this MOA in its entirety. If compliance with the Anti-Deficiency Act alters or impairs BOEM's ability to implement the stipulations of this agreement, BOEM shall consult in accordance with the amendment and termination procedures found at Stipulations XVIII and XX of this agreement.

Execution of this MOA by BOEM, Massachusetts SHPO, and ACHP and implementation of its terms evidences that BOEM has taken into account the effects of this undertaking on historic properties and afforded the ACHP an opportunity to comment.

[SIGNATURES COMMENCE ON FOLLOWING PAGE]

MEMORANDUM OF AGREEMENT
AMONG MASHPEE WAMPANOAG TRIBE,
MASHANTUCKET (WESTERN) PEQUOT TRIBAL NATION,
THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT
(LEASE NUMBER OCS-A 0534)

Signatory:

Bureau of Ocean Energy Management (BOEM)

____ Date: ________________

Elizabeth Klein

Director

Bureau of Ocean Energy Management

**MEMORANDUM OF AGREEMENT
AMONG MASHPEE WAMPANOAG TRIBE,
MASHANTUCKET (WESTERN) PEQUOT TRIBAL NATION,
THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT
(LEASE NUMBER OCS-A 0534)**

Signatory:

Massachusetts State Historic Preservation Officer (SHPO)

____ Date: ________________

Brona Simon

State Historic Preservation Officer

Massachusetts Historical Commission

**MEMORANDUM OF AGREEMENT
AMONG MASHPEE WAMPANOAG TRIBE,
MASHANTUCKET (WESTERN) PEQUOT TRIBAL NATION,
THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT
(LEASE NUMBER OCS-A 0534)**

Signatory:

Advisory Council on Historic Preservation (ACHP)

____ Date: _________________

Reid J. Nelson

Executive Director

Advisory Council on Historic Preservation

**MEMORANDUM OF AGREEMENT
AMONG MASHPEE WAMPANOAG TRIBE,
MASHANTUCKET (WESTERN) PEQUOT TRIBAL NATION,
THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT
(LEASE NUMBER OCS-A 0534)**

Invited Signatory:

Park City Wind LLC

____ Date: ________________

[Name]

[Title]

[Affiliation]

MEMORANDUM OF AGREEMENT
AMONG MASHPEE WAMPANOAG TRIBE,
MASHANTUCKET (WESTERN) PEQUOT TRIBAL NATION,
THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT
(LEASE NUMBER OCS-A 0534)

Invited Signatory:

Mashantucket (Western) Pequot Tribal Nation

____ Date: _________________

[Name]

[Title]

Mashantucket (Western) Pequot Tribal Nation

**MEMORANDUM OF AGREEMENT
AMONG MASHPEE WAMPANOAG TRIBE,
MASHANTUCKET (WESTERN) PEQUOT TRIBAL NATION,
THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION AND
REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT
(LEASE NUMBER OCS-A 0534)**

Invited Signatory:

Mashpee Wampanoag Tribe of Massachusetts

____ Date: _________________

[Name]

[Title]

Mashpee Wampanoag Tribe of Massachusetts

**MEMORANDUM OF AGREEMENT
AMONG MASHPEE WAMPANOAG TRIBE,
MASHANTUCKET (WESTERN) PEQUOT TRIBAL NATION,
THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT
(LEASE NUMBER OCS-A 0534)**

Concurring Party:

Chappaquiddick Wampanoag Tribe

____ Date: _________________

[Name]

[Title]

Chappaquiddick Wampanoag Tribe

**MEMORANDUM OF AGREEMENT
AMONG MASHPEE WAMPANOAG TRIBE,
MASHANTUCKET (WESTERN) PEQUOT TRIBAL NATION,
THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT
(LEASE NUMBER OCS-A 0534)**

Concurring Party:

United States Army Corps of Engineers (USACE)

____ Date: _________________

Justin R. Pabis, PE

Colonel, Corps of Engineers

District Engineer

**MEMORANDUM OF AGREEMENT
AMONG MASHPEE WAMPANOAG TRIBE,
MASHANTUCKET (WESTERN) PEQUOT TRIBAL NATION,
THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT
(LEASE NUMBER OCS-A 0534)**

Concurring Party:

Town of Aquinnah

____ Date: _________________

[Name]

[Title]

Town of Aquinnah

**MEMORANDUM OF AGREEMENT
AMONG MASHPEE WAMPANOAG TRIBE,
MASHANTUCKET (WESTERN) PEQUOT TRIBAL NATION,
THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT
(LEASE NUMBER OCS-A 0534)**

Concurring Party:

Bureau of Safety and Environmental Enforcement (BSEE)

____ Date: _________________

[Name]

[Title]

Bureau of Safety and Environmental Enforcement (BSEE)

MEMORANDUM OF AGREEMENT
AMONG MASHPEE WAMPANOAG TRIBE,

MASHANTUCKET (WESTERN) PEQUOT TRIBAL NATION,
THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT
(LEASE NUMBER OCS-A 0534)

Concurring Party:

National Park Service (NPS)

____ Date: __________________

[Name]

[Title]

National Park Service (NPS)

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MEMORANDUM OF AGREEMENT
AMONG MASHPEE WAMPANOAG TRIBE,
MASHANTUCKET (WESTERN) PEQUOT TRIBAL NATION,
THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NEW ENGLAND WIND OFFSHORE WIND ENERGY PROJECT
(LEASE NUMBER OCS-A 0534)

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

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ATTACHMENT 9 – HISTORIC PROPERTY TREATMENT PLAN FOR NANTUCKET SOUND 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

ATTACHMENT 13 – NEW ENGLAND WIND ONSHORE ARCHAEOLOGICAL MONITORING PLAN

ATTACHMENT 14 – NEW ENGLAND WIND MITIGATION FUNDING OPTIONS

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ATTACHMENT 1 – AREA OF POTENTIAL EFFECTS MAPS

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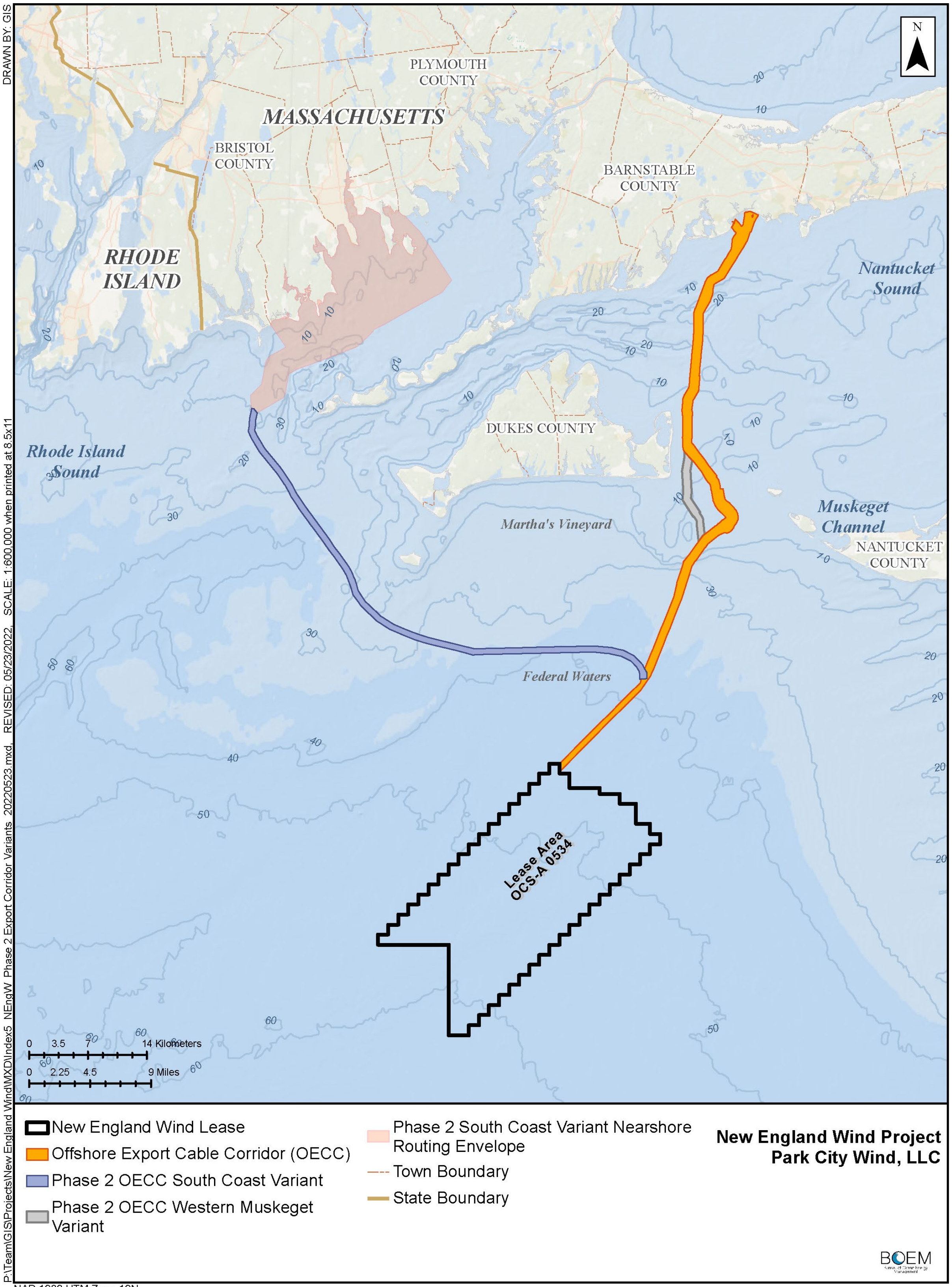
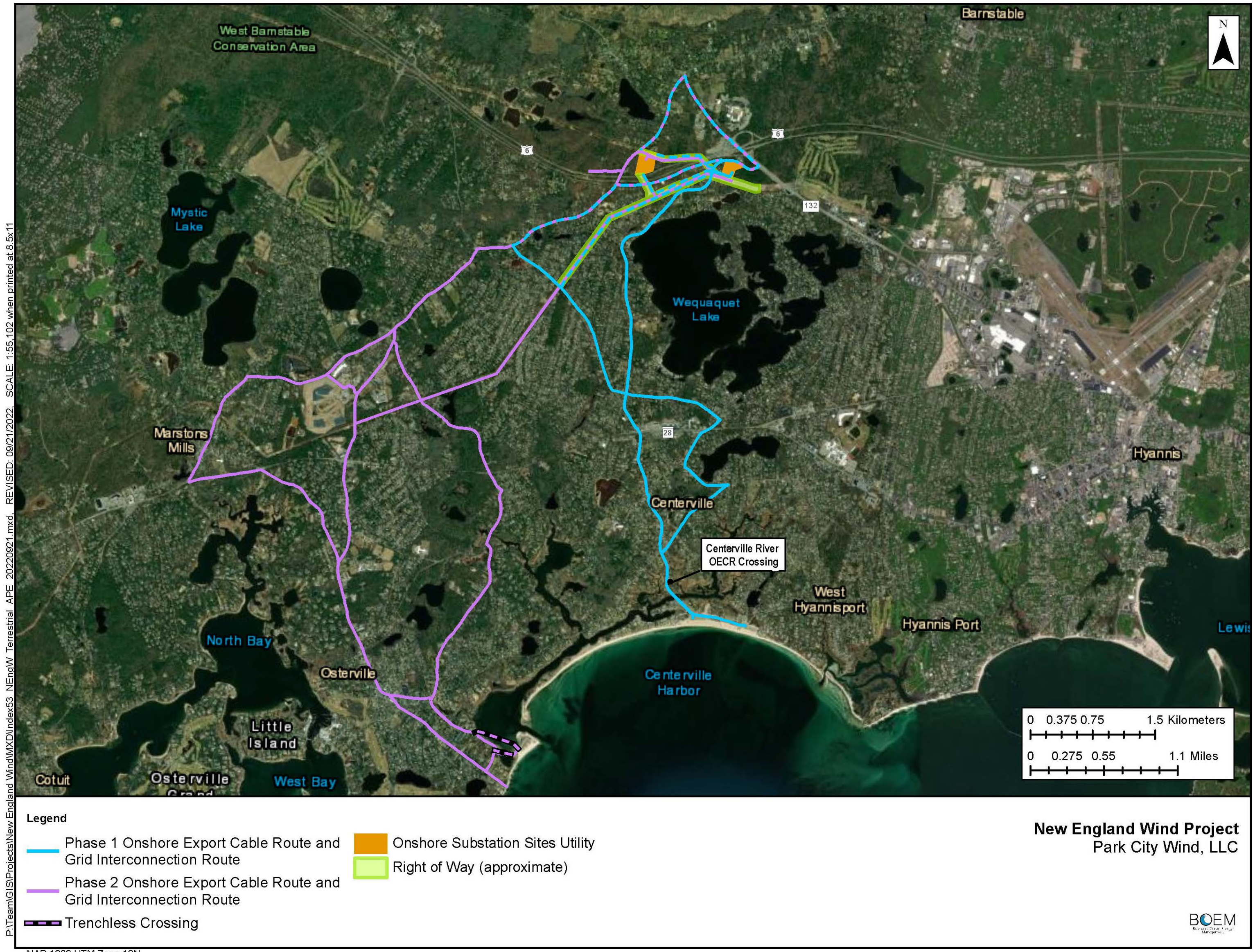


Marine Area of Potential Effects

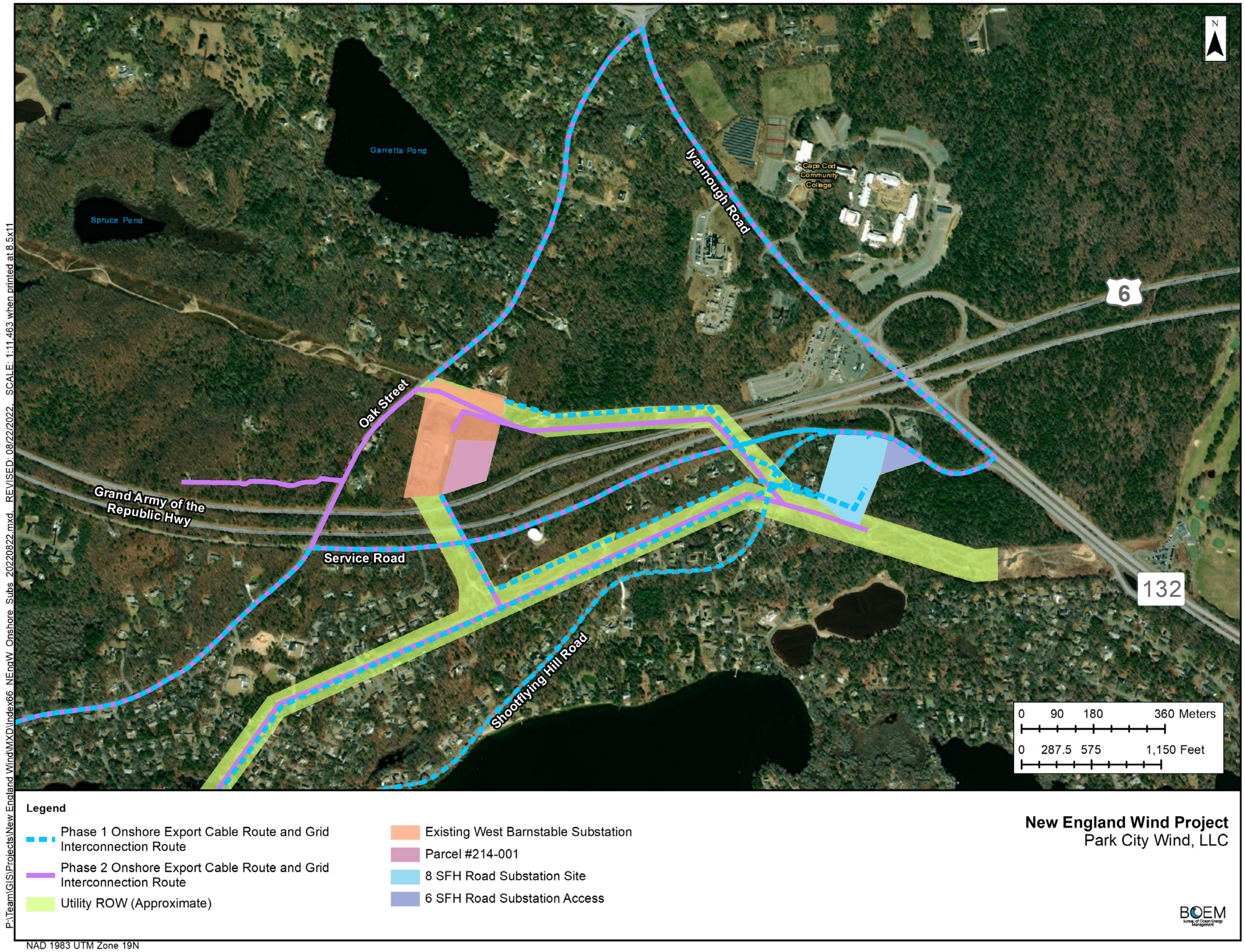


Terrestrial Area of Potential Effects

P:\Team\GIS\Projects\New England Wind\MXD\Index67 NEngW Phase 1 Onshore Landfalls 20220727.mxd REVISED: 07/27/2022 SCALE: 1:7,183 when printed at 8.5x11

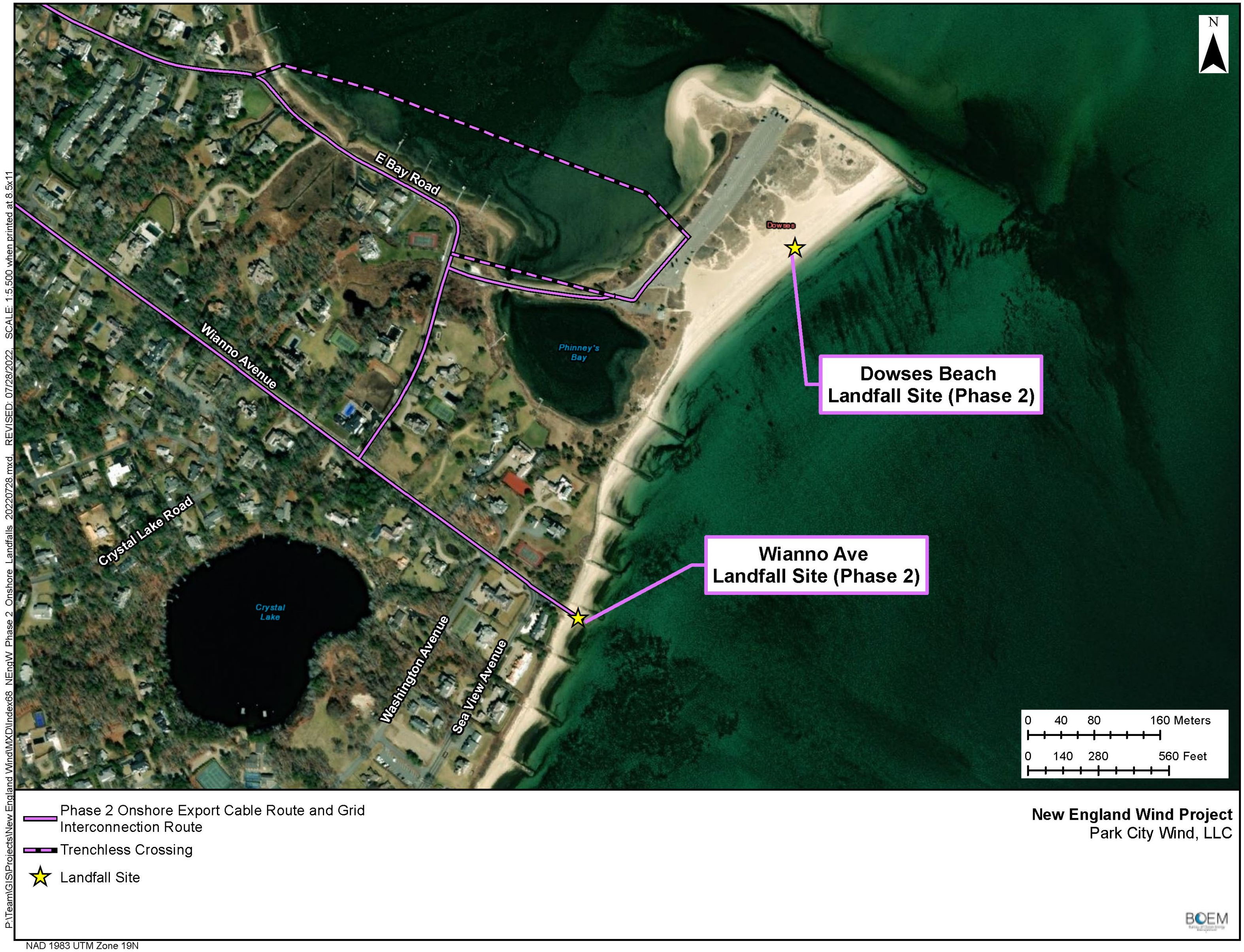
NAD 1983 UTM Zone 19N

Terrestrial Area of Potential Effects, Phase 1 Landfall Sites

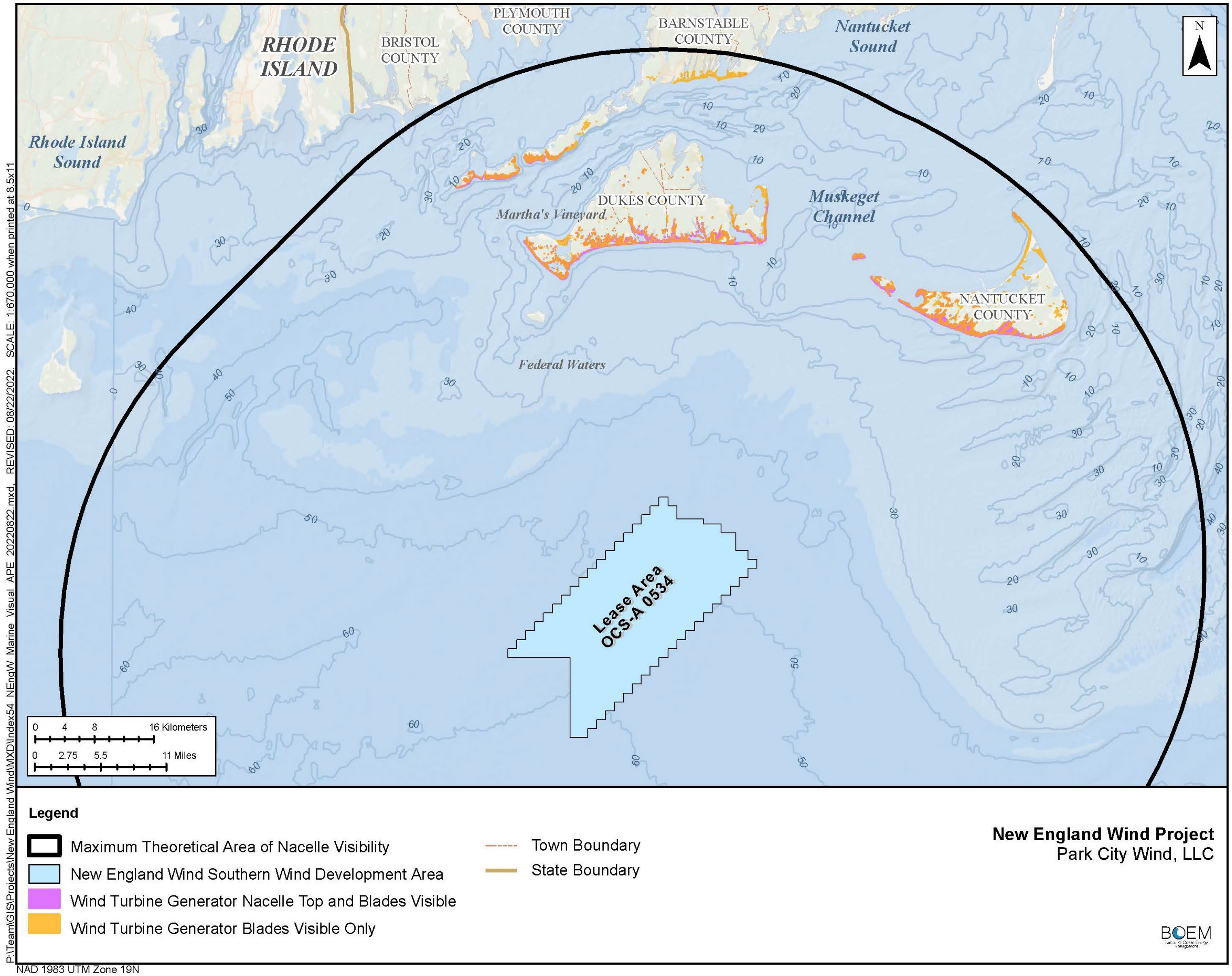


ROW = right-of-way; SFH = Shootflying Hill

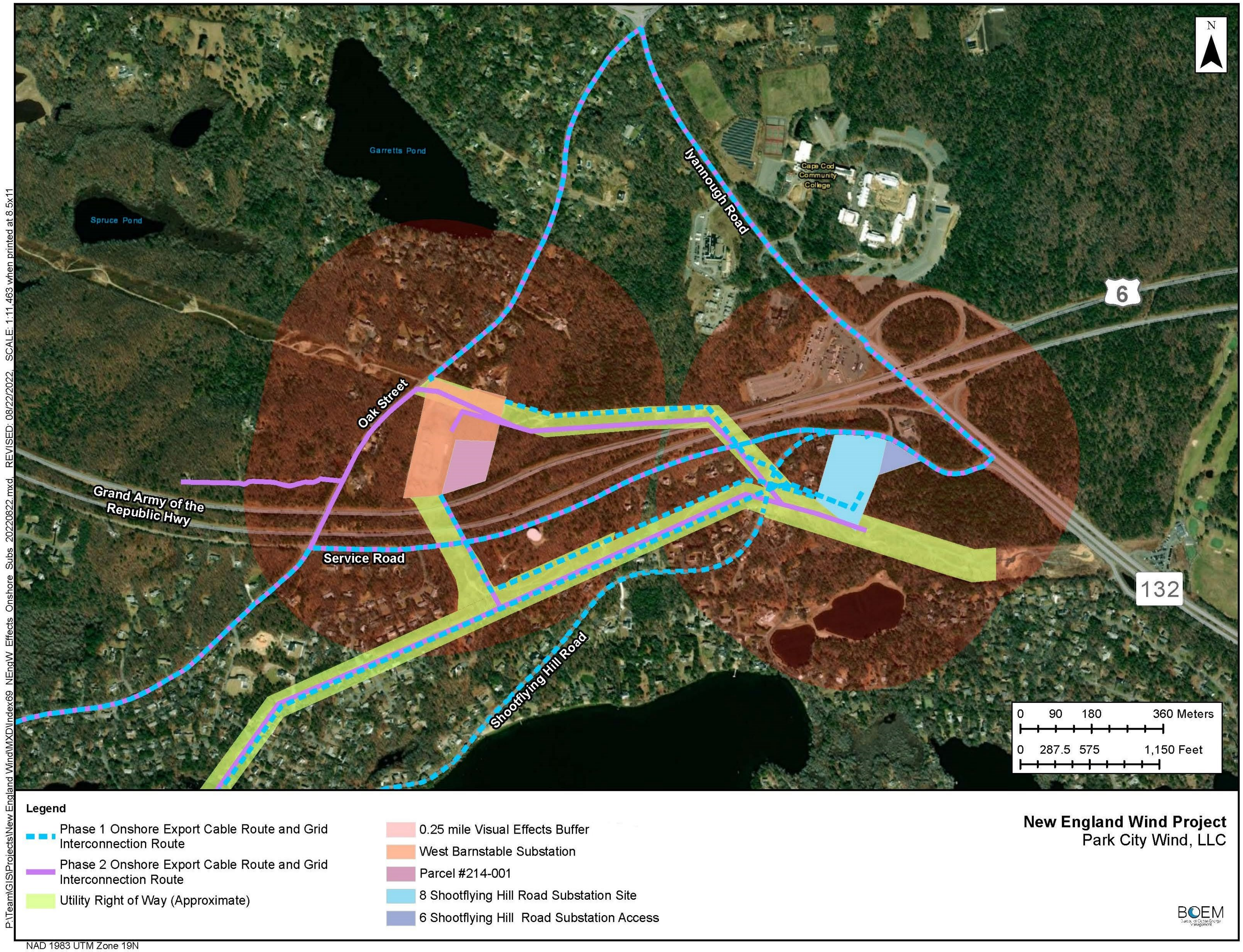
Terrestrial Area of Potential Effects, West Barnstable Substation Area



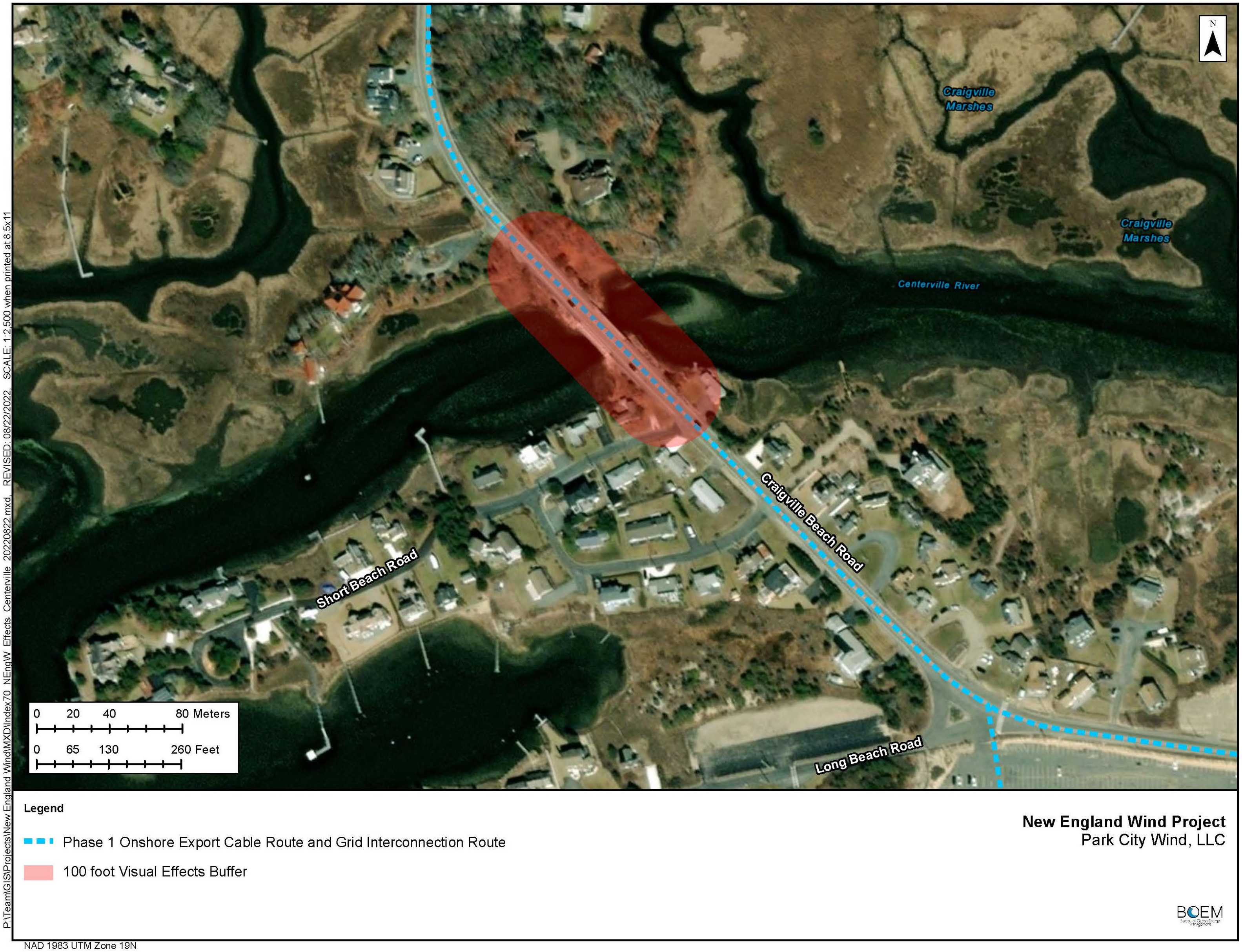
Terrestrial Area of Potential Effects, Phase 2 Landfall Sites



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 – LISTS OF INVITED AND PARTICIPATING CONSULTING PARTIES

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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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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:

February 2024

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EXECUTIVE SUMMARY

This 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 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 (ACHP) regarding the New England Wind project. The conditions of Construction and Operations Plan (COP) approval and the MOA 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 is consistent with, or equivalent to, those substantive baseline mitigation measures identified in the conditions of COP approval and MOA.

This HPTP includes the mitigation measures proposed by the Proponent for historic properties based on the evaluations and outreach performed by the Proponent.

The timeline for implementation of the mitigation measures has been determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP.

This HPTP 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 (New England 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 and through consultation with consulting parties.

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 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 Area of Potential Effects (APE) 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.

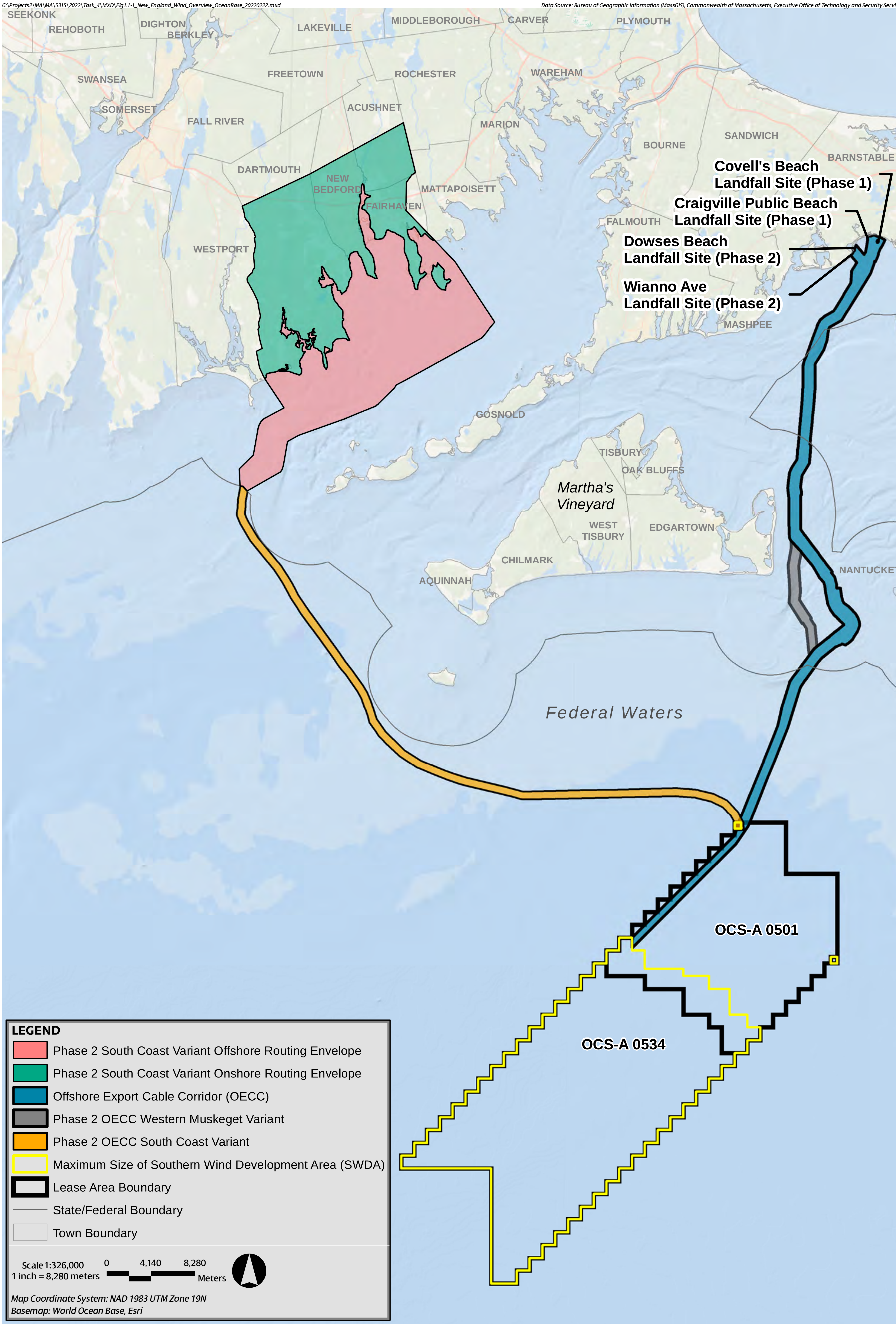
Best Management Practices within the MARA include involvement of a Qualified Marine Archaeologist (QMA) in the design, interpretation, and reporting phases of the non-intrusive, high-resolution geophysical (HRG) survey following BOEM's Guidelines for Providing Archaeological and Historic Property Information 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 APE. 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 APE 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

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



New England Wind
AVANGRID RENEWABLES

Figure 1.1-1
New England Wind Overview

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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) has been developed in accordance with the Section 106 and Section 110(f) review (36 CFR 800) of the Undertaking and the 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 MOA with BOEM, the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation (ACHP), and participating Tribal Nations 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 MOA 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 conditions of COP approval and the MOA as well as with applicable local, state, and federal regulations and permitting requirements.

1.3 Participating Parties

The NEPA substitution process was utilized by BOEM to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). BOEM conducted a series of Section 106-specific meetings with consulting parties.

The Proponent has also conducted outreach meetings with various consulting parties to review the findings of the analysis to date and discuss proposed avoidance measures. These are parties that demonstrated interest in the affected historic property (Participating Parties). The Proponent has conducted outreach with the following parties:

- The Massachusetts Board of Underwater Archaeological Resources
- Participating Tribal Nations

2.0 SUMMARY OF HISTORIC PROPERTY (SUBMERGED HISTORICAL PROPERTIES)

The Proponent identified three potential shipwreck sites (PSWs) within the SWDA [redacted] and one PSW site within main OECC, [redacted]. In addition, two PSWs were identified within the Western Muskeget Variant, [redacted] and two possible shipwreck sites were identified within the South Coast Variant (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

[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			
[redacted]	[redacted]	[redacted]	[redacted] [redacted]
[redacted]	[redacted]	[redacted]	[redacted] [redacted]
[redacted]	[redacted]	[redacted]	[redacted] [redacted]
[redacted]			
[redacted]	[redacted]	[redacted]	[redacted] [redacted]

Table 2.1-1 Historic Properties (PSWs) included in the HPTP (Continued)

[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted] [redacted]			

2.1.1 Southern Wind Development Area (SWDA)

[redacted] [redacted]

[redacted]

[redacted]

Figure 2.0-1

Potential shipwreck sites [redacted] *identified within the SWDA*

[redacted]

[redacted]

[redacted]

[redacted]

2.1.2 *Offshore Export Cable Corridor (OECC)*

[redacted]

[redacted]

[redacted]

New England Wind

AVANGRID RENEWABLES

Figure 2.0-2

Potential shipwreck sites [redacted] *identified within the OECCs*

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 2.0-3

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, while site PSW-3 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.

For the avoidance of all historic properties, the Proponent will provide as-placed and as-laid maps with both the horizontal and, to the extent feasible, vertical impact of all seafloor impacts. These seafloor impacts include anchoring activities, cable installation (including trenching depths and seafloor footprint of the installation vessel), and WTG installation (anchoring and spudding/jack-up vessel placement). The as-built or as-laid placement plats should be submitted at a scale of 1 inch = 1,000 feet, with differential global positioning system accuracy demonstrating that these seafloor disturbing activities did not impact the avoidance criteria applied to the historic property. These documents and maps should be submitted to BOEM no later than 90 days after completion of post-installation inspection surveys for BOEM and consulting parties to review.

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.

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ATTACHMENT 4 – HISTORIC PROPERTY TREATMENT PLAN FOR ANCIENT SUBMERGED LANDFORMS AND FEATURES

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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:

February 2024

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EXECUTIVE SUMMARY

This 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 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 (ACHP), and participating Tribal Nations regarding the New England Wind project. The conditions of Construction and Operations Plan (COP) approval and the 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 MOA.

This HPTP includes the mitigation measures proposed by the Proponent for historic properties based on the evaluations and outreach performed by the Proponent.

The timeline for implementation of the mitigation measures has been determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP.

This HPTP 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 (New England Wind COP) and the Marine Archaeological Resource Assessment Reports (Volume II-D).

Section 3.0 Mitigation Measures

This section provides a review of mitigation measures proposed by the Proponent as identified in the COP and through 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 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. 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, five offshore export cables—two cables for Phase 1 (Park City Wind) and 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 Area of Effects (APE) 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 APE. 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.

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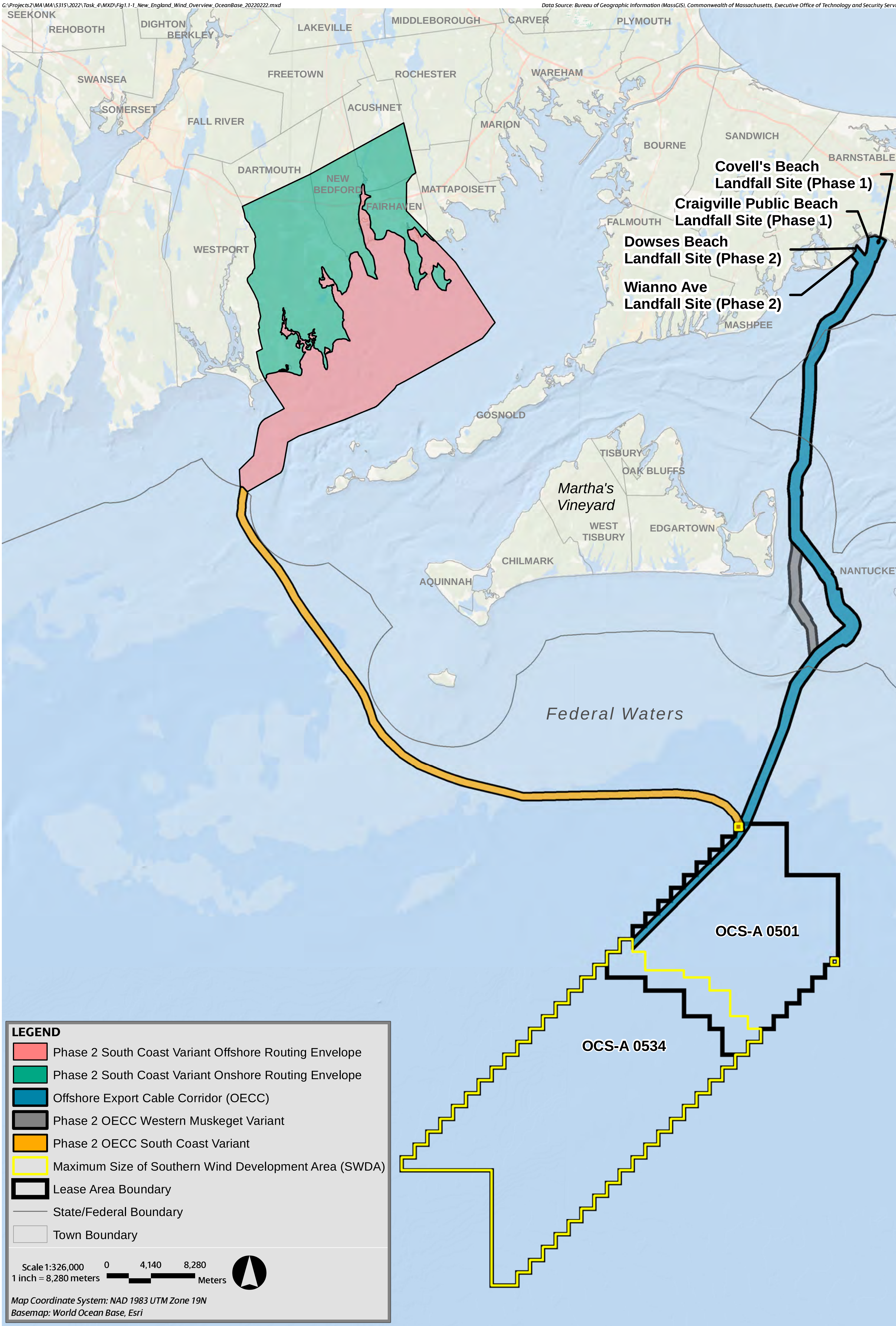
G:\Projects2\MA\MA\5315\2022\Task_4\MXD\Fig1.1-1_New_England_Wind_Overview_OceanBase_20220222.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



New England Wind

AVANGRID RENEWABLES

Figure 1.1-1

New England Wind Overview

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1.1.1 Bottom Disturbing Activities

The APE 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.

1.2 Historic Property Treatment Plan (HPTP) and Section 106 of the National Historic Preservation Act (NHPA)

This Historic Property Treatment Plan (HPTP) has been developed in accordance with the Section 106 and Section 110(f) review (36 CFR 800) of the Undertaking and the 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 MOA with the BOEM, the Massachusetts State Historic Preservation Officer (MA SHPO), the Advisory Council on Historic Preservation (ACHP), and participating Tribal Nations 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 MOA 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 conditions of COP approval and the MOA as well as with applicable local, state, and federal regulations and permitting requirements.

1.3 Participating Parties

The NEPA substitution process was utilized by BOEM to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). BOEM conducted a series of Section 106-specific meetings with consulting parties.

The Proponent has also conducted outreach meetings with the consulting parties to review the findings of the analysis to date and discuss proposed mitigation measures. These are parties that demonstrated interest in the affected historic property (Participating Parties). The Proponent has conducted outreach with the following parties:

- 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 Massachusetts Board of Underwater Archaeological Resources (MBUAR)

Additionally, any work related to this HPTP conducted in Massachusetts state waters will require issuance of a Special Use Permit (SUP) by MBUAR; this scope of work will be reviewed and commented on by MBUAR as part of the SUP application 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]

The following text, figures, and tables provide the SAL locations within the project areas as well as site descriptions extracted from the geophysical datasets and supporting documents.

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 APE 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. These landforms are likely to have been living surfaces available to populations present on the OCS during times of lower sea level. 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]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]				
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
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[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]				
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 2-1 Historic Properties (SALs) included in this HPTP (Continued)

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]				
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
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[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 2-1 Historic Properties (SALs) included in this HPTP (Continued)

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]				
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[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. These portions of the preserved former terrestrial landscape are of cultural importance to Tribal Nations as they are likely to represent preserved remnants of the landscape their ancestors inhabited.

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 Tribal Nations and are recommended eligible for listing in the NRHP under Criterion D.

[redacted]

New England Wind

AVANGRID RENEWABLES

Figure 2.1-1

SAL avoidance areas interpreted and mapped in the SWDA

[redacted]

New England Wind

Figure 2.1-2

SAL avoidance areas interpreted and mapped in the OECC and Western Muskeget Variant

[redacted]

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 within the upper 6 meters of the seabed. The results of the data will be used to develop a detailed description of the landscape at the time of potential occupation. Based on Tribal input, historic uses of indigenous flora and fauna, evidence of which may be recovered during the geoarchaeological campaign, may be better understood through the context of oral histories and ecological knowledge.

3.1.1 Purpose and Intended Outcome

Prior to this study, geoarchaeological information for this area is limited at best. Recovery of physical samples through coring can provide data useful for reconstructing the environments across Nantucket Sound and the OCS. Current understanding of these landscapes is based on relative sea level curves, which may not accurately reflect the timing and extent of environmental changes related to sea level rise following the last glacial maximum (LGM). By developing a more comprehensive understanding of the landscape across the Project area, we may be able to identify specific environmental changes and how they may have impacted early inhabitants.

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, 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 APE, 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. The ongoing mitigation study includes limited sampling of all affected SALs across the OCS, providing a baseline of data points, while the current study, outlined below, provides for more in-depth testing of specific feature types (e.g., kettle ponds versus fluvial margins). The in-depth testing may result in improved identification of future features from geophysical data in the absence of coring or other ground disturbance.

For the current study, a variety of SAL types are planned for sampling: a preserved fluvial terrace in the nearshore zone in Nantucket Sound, a preserved fluvial margin in the Muskeget Channel area, a preserved kettle pond/lake feature in the offshore portion of the OECC, and potential preserved channel banks farther offshore in the SWDA.

Within the OECC, 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. The total quantity of vibracores will range from 24-32 in the OECC, representing an average of 8-10 cores per submerged, ancient landform type. New England Wind may opt to use an alternate section of the OECC, known as the Western Muskeget Variant. The Western Muskeget Variant includes three 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 six 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 proposed 24-32 cores from the OECC. The total number of vibracores to be collected in the OECC (including the Western Muskeget Variant) would be 30-38.

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 by 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 25-34. 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.

Unlike the OECC, no previous geoarchaeological cores sampled the interpreted SALs. In the SWDA, a combination of collecting 1-2 cores at the majority of the SALs to sample identified horizons and collecting a series of closely spaced cores at 2-4 select (not all) SALs based on similar geomorphic characteristics will be utilized; up to 32 cores are anticipated.

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 Nation 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, 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 APE, 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, which 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 largely rely on the geophysical interpretation. Coring will allow for ground-truthing of the types of landscape features present. 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 within the OECC that exhibit significant preservation potential, including: a preserved fluvial margin terrace within the nearshore zone [redacted], a preserved fluvial margin along Muskeget Channel [redacted] and a preserved kettle/pond lake feature preserved in the offshore portion of the OECC leading into the SWDA [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 Tribal Nation 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. Following completion of sampling, the remainder of the working half of each core will be screened where possible; coarser or consolidated sediments may require hand sorting.

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

Core processing will occur at laboratories of opportunity in region for the SWDA; these will be decided upon pending vessel docking, scheduling, and through coordination with consulting parties. Cores from the OECC will be examined by the QMA at a suitable laboratory facility. Tribal Nations will be invited to participate during core opening and processing. Tribal Nation representatives participating in this effort will be compensated and provided with travel and per diem costs. Laboratory processing for the OECC and SWDA cores will be coordinated specifically to prevent scheduling conflicts, so that attendance to all activities is possible. 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 in climate-controlled conditions through draft report review by the relevant QMAs. Alternative length of time and location can be discussed during the consultation process and will include the requirements for long-term storage methods and core/sampling viability. 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. Screening of sediment for evidence of human 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, and faunal 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, or similarly qualified facility, 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.

Sediment screening will occur once all other samples are collected as this will destroy the remainder of the working half. The archival half will not be included in any of the above screenings. 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 Tribal Nations for both state and federal waters. In the unlikely event any artifacts are identified during screening, they will be treated as Unanticipated Discoveries.

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 Secretary of the Interior (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 technical reports with supporting digital data files. Separate reports will be prepared for the OECC and SWDA.

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 the consulting parties 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 Tribal Nations are discussed in Section 3.3.

3.1.7 Sampling Sensitivity

The Tribal Nations have expressed concern with disturbance of the subsurface within the Nantucket Sound Traditional Cultural Place (TCP) 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 TCP.

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. 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 practicable 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. The ROV will be tracked using an Ultra-Short Base Line (USBL) positioning system. 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 and Tribal Nations for review and comment prior to deployment. The Proponent will construct a 3D model defining the spatial relationship of project components and installation methodology (e.g., cable installation via jetting) relative to the SALs considered for the post-construction seafloor assessment. The 3D model will identify portions of the SALs within the vertical APE that will be impacted and possess a high preservation potential for evidence of human occupation. The Proponent will coordinate with BOEM and Tribal Nations on the results of this effort to select locations for the post-construction seafloor assessment.

Under the QMA's direction, the visual survey will inspect the installed cable centerline and be conducted to assess the presence/absence of displaced cultural materials, potentially from the SAL. This visual survey will address up to 3 impacted high potential SALs where ground disturbance occurred.

Tribes/Tribal Nations will be afforded the opportunity to participate as monitors during the post-construction seafloor inspections either via live feed[1] or on the vessel, depending upon vessel space, monitors' offshore safety training and certification, monitors' availability, and health and safety concerns. Tribal Nation representatives participating in this effort will be compensated and provided with travel and per diem costs.

Results from this survey will be documented in final reports from the QMAs for the SWDA and OECC. The post-construction seafloor assessment will be completed no later than 90 calendar days post-final cable burial. If unanticipated issues arise during the course of offshore construction that prevent this measure from being completed within 90 calendar days post-final cable burial, the Proponent will notify BOEM, propose an alternate completion timeframe, and reach agreement with BOEM on the timeframe.

3.3 Tribal Focused Mitigation

The following ideas and mitigation plans have been proposed to support Tribal Nation 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 in Nantucket Sound. 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

[1] Every reasonable effort will be made to maintain a live feed; should technological issues arise where the live feed cannot be maintained, a recording will be provided.

results that were obtained. Input from the Tribal Nations 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 Tribal Nations. 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 QGIS[2] (freeware) with the Tribal Nations.
- The Project proponent team will set up one workshop for each Tribal Nation to provide hands-on training for the use of the selected geographic information system (GIS) software. This would include assistance getting the GIS software configured on a computer (provided by the Tribal Nations) 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 Nation representatives and community.

One presentation for each Tribal Nations could be planned and, as requested, tailored for the audience specified by each Tribe/Tribal Nation. Presentations would generally focus on the topic of the offshore environment and submerged landscapes. For example, Tribal Nations 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 Tribal Nations the knowledge that has been gained by the submerged landscape mitigation study. The Project proponent will develop the presentation resources to share with Tribal Nations and Tribal Nations will decide if they would like to provide an opportunity for MHC and MBUAR to participate and comment on draft materials where feasible[3].

3.4 Post-Installation Maps

For the avoidance of all historic properties, the Proponent will provide as-placed and as-laid maps with both the horizontal and, to the extent feasible, vertical impact of all seafloor impacts. These seafloor impacts include anchoring activities, cable installation (including trenching depths and seafloor footprint of the installation vessel), and wind turbine generator (WTG) installation (anchoring and spudding/jack-up vessel placement). The as-built or as-laid placement plats should be submitted at a scale of 1 inch = 1,000 feet, with differential global positioning system accuracy demonstrating that these seafloor disturbing activities did not impact the avoidance criteria applied to the historic property. These documents and maps should be submitted to BOEM no

[2] 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.

[3] MBUAR will receive the draft and final tech report as part of the requirements of the SUP.

later than 90 days after completion of post-installation inspection surveys for BOEM and consulting parties to review.

3.5 Funds and Accounting

The Proponent is proposing $1,800,000 in total funding for mitigation measures proposed by the Proponent in Sections 3.1 through 3.3 to resolve the adverse effects at the 49 SALs and Nantucket Sound TCP. This funding amount assumes unavoidable adverse effects to 49 SALs. However, Park City Wind may be able to avoid adverse effects to some, and potentially all, of the SALs. The funding amount presented is the total for both phases of New England Wind.

4.0 IMPLEMENTATION

4.1 Timeline

It is anticipated that the mitigation measures identified in Section 3.0 will commence prior to construction. The specific timeline prior to construction will be agreed upon by the Proponent and 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 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 consultation related to dispute resolution if needed during implementation of the HPTP.

4.2.2 Avangrid Renewables, LLC

- The Proponent will be responsible for implementing the HPTP.
- The Proponent will be responsible for considering the feedback 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 is performed by professionals who have demonstrated professional experience consulting with federally recognized Tribal Nations.

4.2.3 Massachusetts Historical Commission (MHC); Massachusetts State Historic Preservation Officer; Massachusetts Bureau of Underwater Archaeological Resources

The state agencies will be participating consulting parties and provide subject matter expertise to support completion of the HPTP mitigation and compliance with all state regulations. Further, all work in Massachusetts state waters will be done under a Special Use Permit, issued to the QMAs by MBUAR.

4.2.4 Tribal Nations

- Provide feedback on proposed geoarchaeological coring locations.
- Tribal Nations 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.

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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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.

February 2024

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EXECUTIVE SUMMARY

This 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 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 (ACHP) regarding the New England Wind project. The conditions of Construction and Operations Plan (COP) approval and the MOA 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 is consistent with, or equivalent to, those substantive baseline mitigation measures identified in the conditions of COP approval and MOA.

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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 (New England 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 and through consultation with consulting parties.

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 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. 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.

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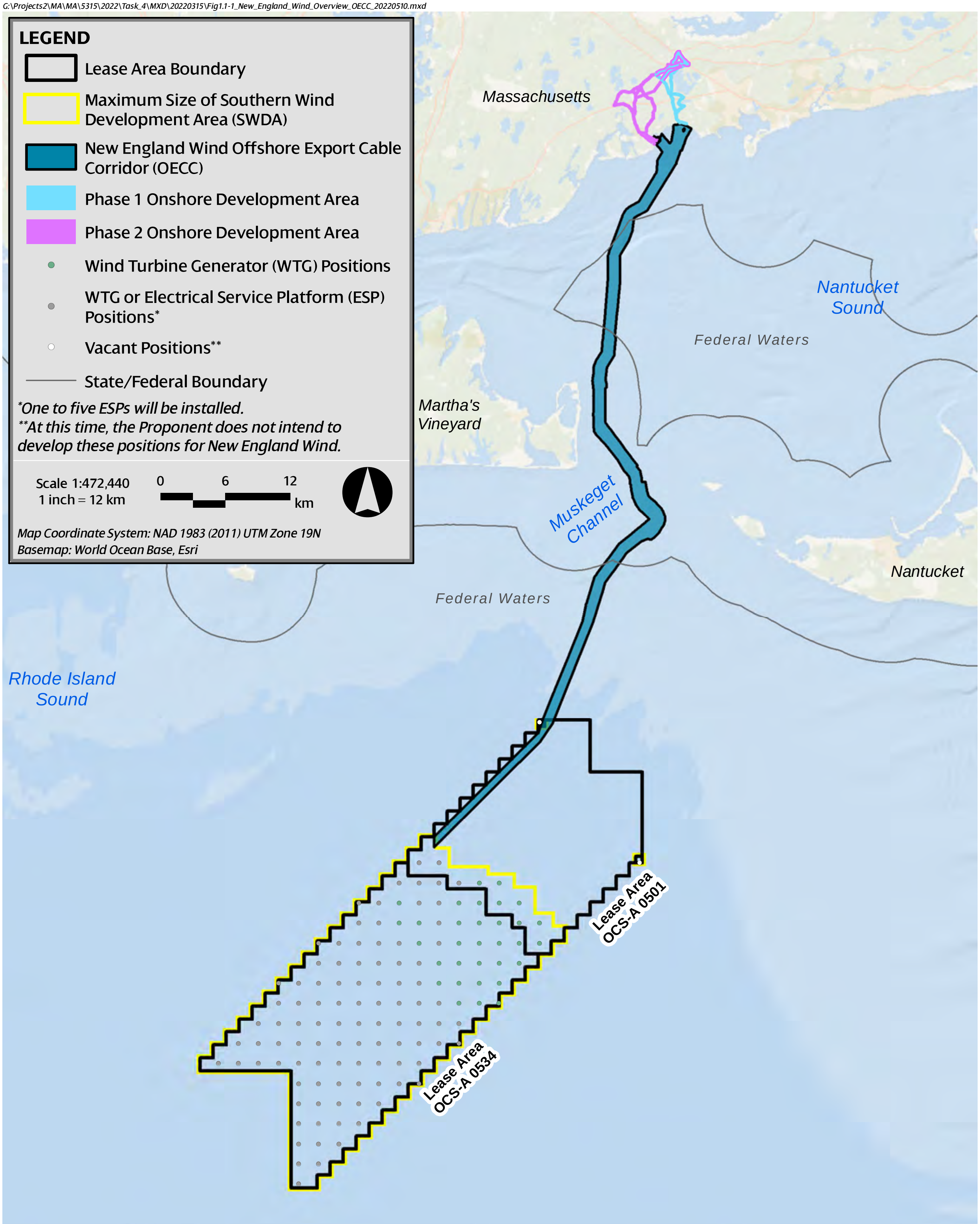

Figure 1.1-1
New England Wind Overview

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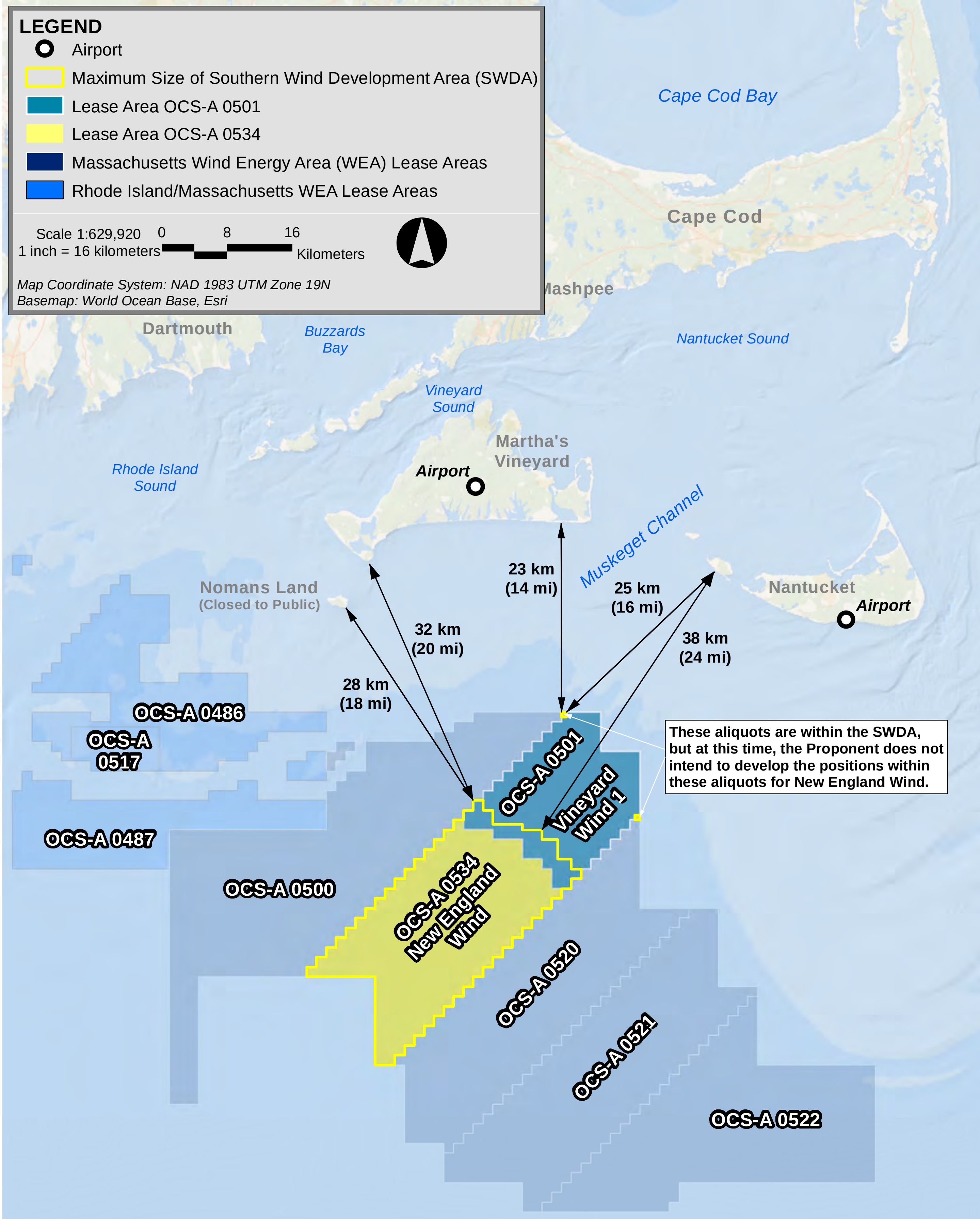

New England Wind
AVANGRID RENEWABLES

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) has been developed in accordance with the Section 106 and Section 110(f) review (36 CFR 800) of the Undertaking and the 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 MOA with BOEM, the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation (ACHP) regarding the New England Wind project.

The conditions of COP approval and MOA include measures to avoid and/or minimize adverse effects to identified historic properties, including planned distance of the Undertaking from historic properties, uniform Wind Turbine Generator (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 conditions of COP approval and the 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 was utilized by BOEM to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). BOEM conducted a series of Section 106-specific meetings with consulting parties.

The Proponent has also conducted outreach meetings with various consulting parties to review the findings of the analysis to date and discuss proposed mitigation measures. These are parties that demonstrated interest in the affected historic property (Participating Parties). The Proponent has conducted outreach with the following parties:

- The Town of Aquinnah
- The Wampanoag Tribe of Gay Head (Aquinnah)

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. A view of the SWDA is possible to the south. The view of the Homestead to the north and east will be unaffected. A 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

New England Wind

AVANGRID RENEWABLES

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 AND MINIMIZATION MEASURES

Mitigation and minimization measures for the Edwin Vanderhoop Homestead and the Gay Head - Aquinnah Shops Area are detailed below.

3.1 Mitigation Measures

3.1.1 Vineyard Sound and Moshup's Bridge Traditional Cultural Place (TCP) Mitigation

The Edwin Vanderhoop Homestead and Gay Head – Aquinnah Shops Area are located within the bounds of the Vineyard Sound and Moshup's Bridge Traditional Cultural Place (TCP). Thus, mitigation measures outlined in the HPTP for the Vineyard Sound and Moshup's Bridge TCP are also applicable to the historic resources listed in this HPTP. See the HPTP for the Vineyard Sound and Moshup's Bridge TCP in Attachment 8 of the MOA for more detail. Mitigation measures are subject to change as consultation is ongoing.

3.1.2 Ongoing Maintenance of Gayhead - Aquinnah Shops Area and Edwin Vanderhoop Homestead

Purpose and Intended Outcome

In response to feedback provided by the Town of Aquinnah, the Proponent proposes to include funding to support the ongoing maintenance of the Aquinnah Shops Area and Edwin Vanderhoop Homestead with the goal of protecting these historic properties for future generations.

Scope of Work

The Town of Aquinnah expects that funding of ongoing maintenance work will primarily consist of the upkeep of buildings, structures, pathways, hardscapes, and softscapes in and around the Aquinnah Shops Area and Edwin Vanderhoop Homestead.

Methodology

The Town of Aquinnah will implement the ongoing maintenance and will hire an outside consultant if needed.

Standards

All work will be conducted in accordance with applicable standards. Examples of standards that may be applicable include:

- *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;*

- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68); and
- The Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation Professional Qualifications Standards* (36 CFR Part 61), as applicable.

Documentation

The Proponent will provide the following documentation to the Participating Parties for their review:

- List of anticipated maintenance tasks. This list will be based on the information included under "Scope of Work" and will be developed with input from the Town of Aquinnah.
- Description of proposed funding mechanism.
- Annual progress report to BOEM describing the implementation of the mitigation measures, if needed. (If the mitigation measure is limited to a one-time payment, an annual progress report is not expected to be required.)

Funds and Accounting

At present, it is envisioned that the Proponent will provide the Town of Aquinnah with a one-time payment of $200,000; the funds will be available to the Town of Aquinnah to withdraw from for annual maintenance activities over the life of the lease.

3.2 Additional Minimization Measures

The Proponent is also implementing the following minimization 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

4.1 Timeline

It is anticipated that the proposed funding will be provided prior to construction for each Phase of New England Wind. The specific timeline prior to construction will be agreed upon by the Proponent and 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.

4.2 Organizational Responsibilities

4.2.1 Bureau of Ocean Energy Management (BOEM)

- BOEM is responsible for consultation related to dispute resolution if needed during implementation of the HPTP.

4.2.2 Avangrid Renewables, LLC

- The Proponent will be responsible for funding the ongoing maintenance activities (see Section 3.1.2) and for implementing the additional minimization measures (see Section 3.2).
- The Proponent will be responsible for considering the feedback provided by the parties identified.
- 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 Tribal Nations.
- Annual reporting to BOEM on implementation of the HPTP, if required. (If the mitigation measure is limited to a one-time payment, an annual progress report from the Proponent is not expected to be required.)

4.2.3 Participating Parties

- Identify expected list of maintenance tasks.
- Participating Parties are responsible for providing feedback on the documentation items identified in Section 3.1.2 within 45 days.
- If required, provide an annual report on maintenance activities to BOEM and/or the Proponent.

4.2.4 Other Parties

The Proponent does not anticipate additional consulting parties.

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 6 – HISTORIC PROPERTY TREATMENT PLAN FOR CHAPPAQUIDDICK ISLAND TCP

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New England Wind Historic Property Treatment Plan for the Chappaquiddick Island Traditional Cultural Property

Submitted to:
Bureau of Ocean Energy Management
45600 Woodland Rd
Sterling, VA 20166

Submitted by:
Park City Wind LLC

Prepared by:

February 2024

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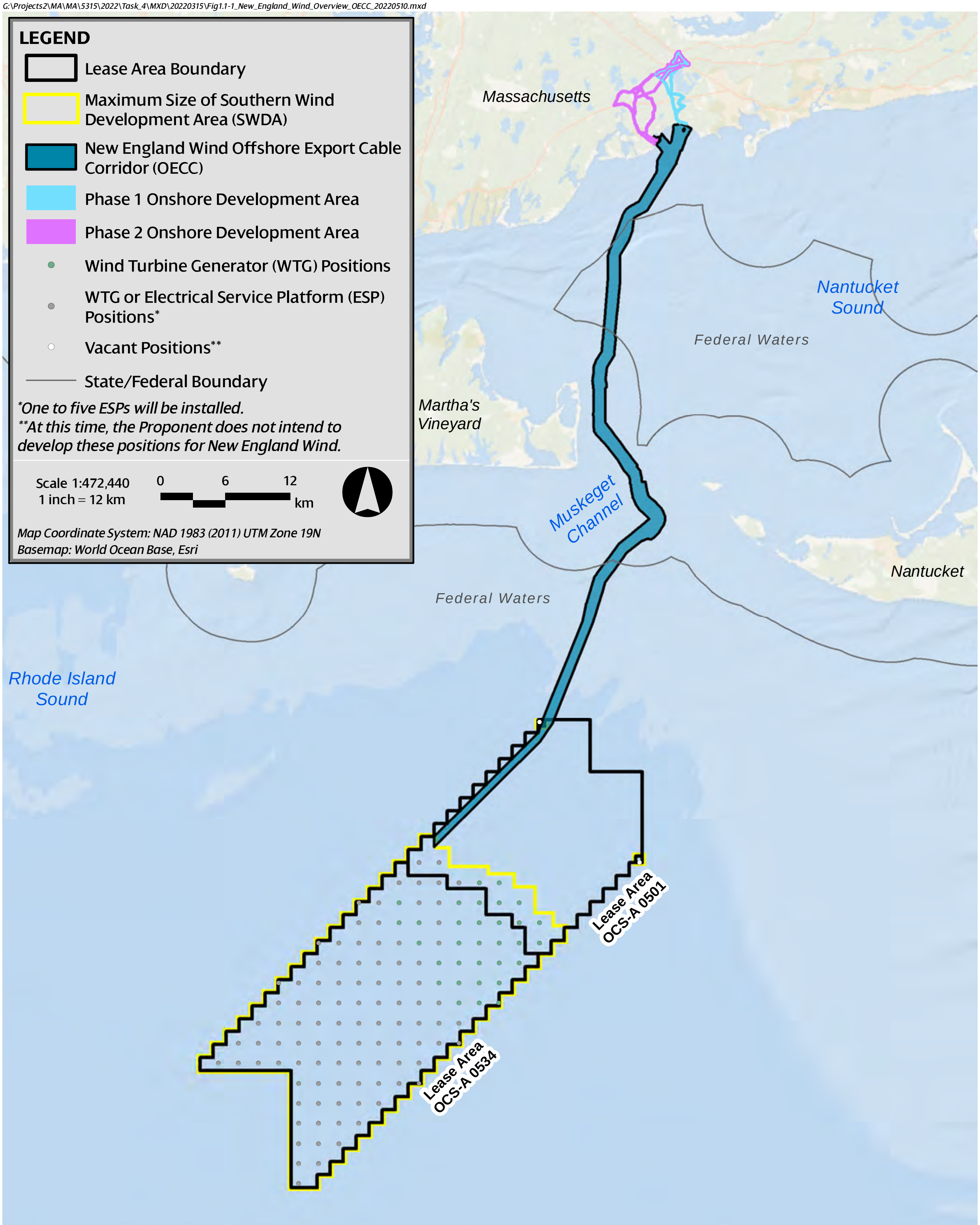
LEGEND
Lease Area Boundary
Maximum Size of Southern Wind Development Area (SWDA)
New England Wind Offshore Export Cable Corridor (OECC)
Phase 1 Onshore Development Area
Phase 2 Onshore Development Area
Wind Turbine Generator (WTG) Positions
WTG or Electrical Service Platform (ESP) Positions*
Vacant Positions**
State/Federal Boundary
*One to five ESPs will be installed.
**At this time, the Proponent does not intend to develop these positions for New England Wind.
Scale 1:472,440
1 inch = 12 km
0
6
12
km
Map Coordinate System: NAD 1983 (2011) UTM Zone 19N
Basemap: World Ocean Base, Esri
Massachusetts
Nantucket Sound
Federal Waters
Martha's Vineyard
Muskeget Channel
Nantucket
Federal Waters
Rhode Island Sound
Lease Area OCS-A 0501
Lease Area OCS-A 0534

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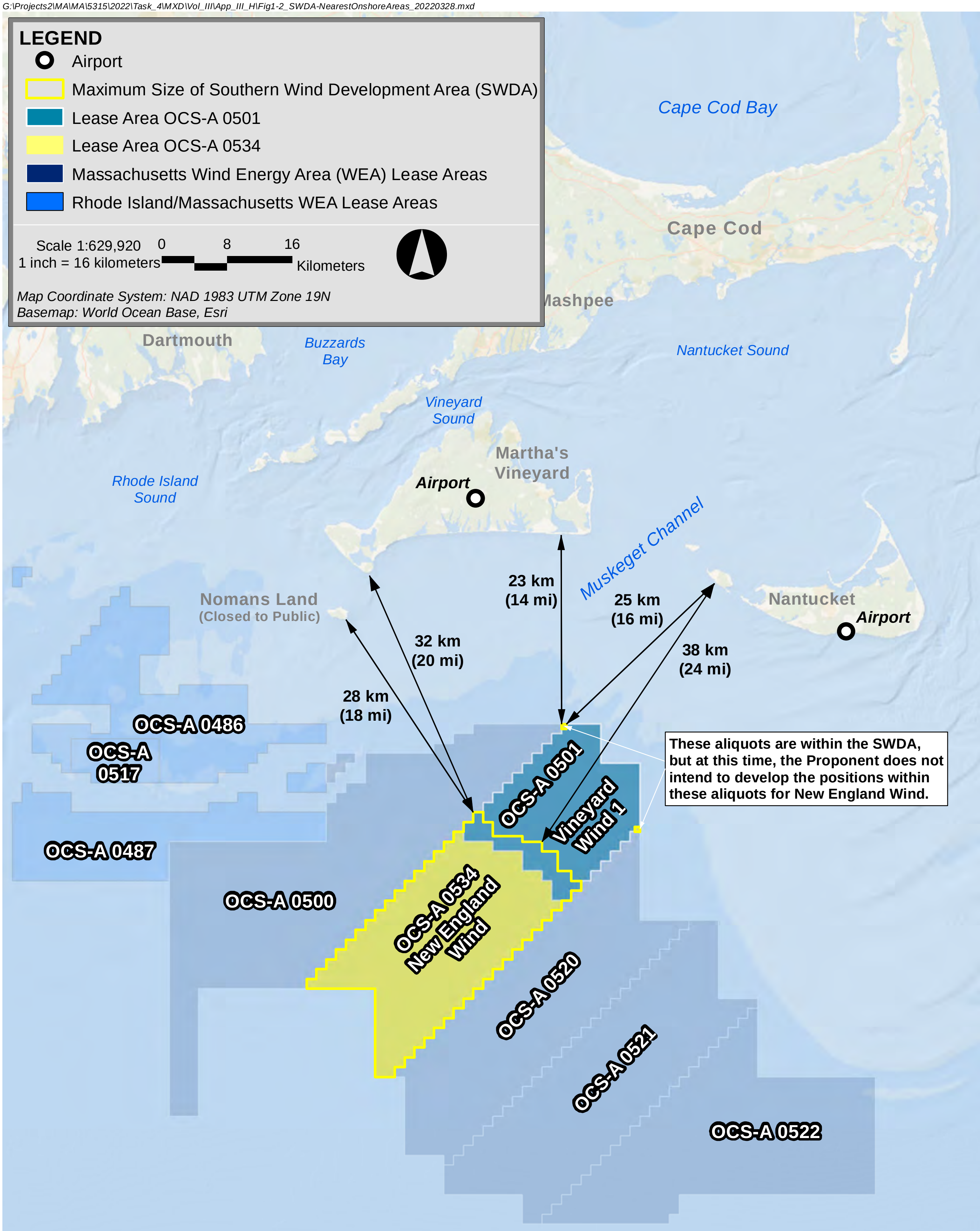

New England Wind
AVANGRID RENEWABLES

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) has been developed in accordance with the Section 106 and Section 110(f) reviews (36 CFR 800) of the Undertaking and the 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 MOA with the Bureau of Ocean Energy Management (BOEM), the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation (ACHP) and participating Tribal Nations and descendant communities regarding the New England Wind project.

The conditions of COP approval and MOA 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 conditions of COP approval and the 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 was utilized by BOEM to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). BOEM conducted a series of Section 106-specific meetings with consulting parties.

The Proponent has also conducted outreach meetings with consulting parties to review the findings of the analysis to date and discuss proposed mitigation measures. These are parties that demonstrated interest in the affected historic property (Participating Parties). The Proponent has conducted outreach with the following parties:

- The Chappaquiddick Tribe of Wampanoag Nation

2.0 SUMMARY OF HISTORIC PROPERTY (CHAPPAQUIDDICK ISLAND TRADITIONAL CULTURAL PLACE)

Chappaquiddick Island has been determined by BOEM to be potentially eligible for listing on the National Register as a Traditional Cultural Place (TCP; BOEM 2020). The designation does not contain specific boundaries, but would roughly encompass the Island of Chappaquiddick, Norton Point in Edgartown, and Katama Bay (Figure 2.0-1). According to BOEM (2020):

"The TCP would be significant under Criterion A for its association with and importance in maintaining the continuing cultural identity of the community."

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New England Wind
AVANGRID RENEWABLES

Figure 2.0-1
Historic Property: Chappaquiddick Island TCP

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The setting of the Chappaquiddick Island TCP and its viewshed would be minimally altered through the introduction of new elements. The TCP is approximately 37.2 km (23.1 mi) from the nearest WTG or ESP. On average for all meteorological conditions, New England Wind WTGs/ESP(s) might be visible 22% of the time from the Chappaquiddick Island TCP. Photo simulations from Martha's Vineyard, in particular South Beach (Photo simulations B-3a to B-3g in Appendix III-H.a), demonstrate that the SWDA will be visible from a portion of Chappaquiddick Island as well as Norton Point and Katama Bay when looking southward. Views to the north, east, and west from these locations will not be affected. Further, visibility of the SWDA is limited to the areas along the coastline and within Katama Bay. Additionally, there will be no visual effect from New England Wind's undersea cables. Photo simulations B-4a to B-4e for Wasque Reservation and B-3a to B-3g for South Beach in Appendix III-H.a provide views toward the SWDA from the Chappaquiddick Island TCP.

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 AND MINIMIZATION MEASURES

Mitigation and minimization measures for the Chappaquiddick Island TCP are detailed below.

3.1 Survey and Geographic Information System (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 Chappaquiddick Island TCP (both those previously identified and yet to be determined) and developing a Geographic Information System (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. At present, eight contributing properties to the Chappaquiddick Island TCP have been identified; 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 MHC survey forms.

Methodology

The Proponent will prepare a request for proposal (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 of the Chappaquiddick 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 the island and its occupation by the Chappaquiddick. 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 Tribal Nations and descendant communities. 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

The total funding amount for mitigation measures described in Sections 3.1 and 3.2 will not exceed $200,000 for the New England Wind project.

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 Chappaquiddick 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 Tribal Nations and descendant communities.

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

The total funding amount for mitigation measures described in Sections 3.1 and 3.2 will not exceed $200,000 for the New England Wind project.

3.3 Additional Minimization Measures

The Proponent is also implementing the following minimization 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

4.1 Timeline

It is anticipated that the mitigation measures identified in Sections 3.1 and 3.2 will commence prior to construction. The specific timeline prior to construction will be agreed upon by the Proponent and 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 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 consultation related to dispute resolution if needed during implementation of the HPTP.
- 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 feedback 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 Tribal Nations and descendant communities.

4.2.3 Tribes

- Identify resources of significance to support GIS database development mitigation measure (if selected).
- Provide feedback on draft materials within 45 days.

4.2.4 Other Parties

The Proponent does not anticipate additional consulting parties.

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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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

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ATTACHMENT 7 – HISTORIC PROPERTY TREATMENT PLAN FOR GAY HEAD LIGHTHOUSE

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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.

February 2024

TABLE OF CONTENTS

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EXECUTIVE SUMMARY

This 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 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 (ACHP) regarding the New England Wind project. The conditions of Construction and Operations Plan (COP) approval and the MOA 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 is consistent with, or equivalent to, those substantive baseline mitigation measures identified in the conditions of COP approval and MOA.

This HPTP includes the mitigation measures proposed by the Proponent for historic properties based on the evaluations and outreach performed by the Proponent.

The timeline for implementation of the mitigation measures has been determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP.

This HPTP 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 (New England 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 and through consultation with consulting parties.

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 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. 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 Area of Potential Effects (APE) 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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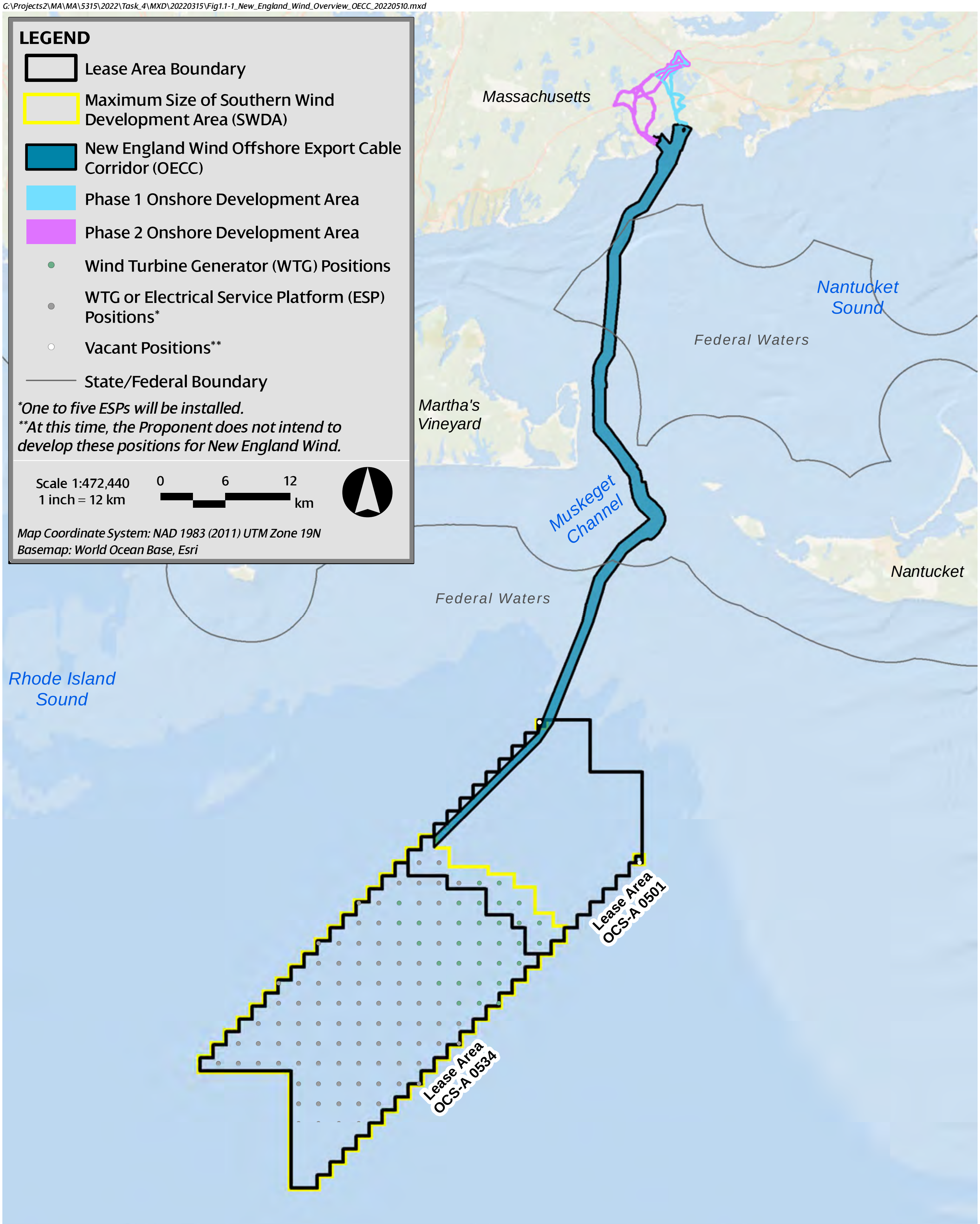

New England Wind
AVANGRID RENEWABLES

Figure 1.1-1
New England Wind Overview

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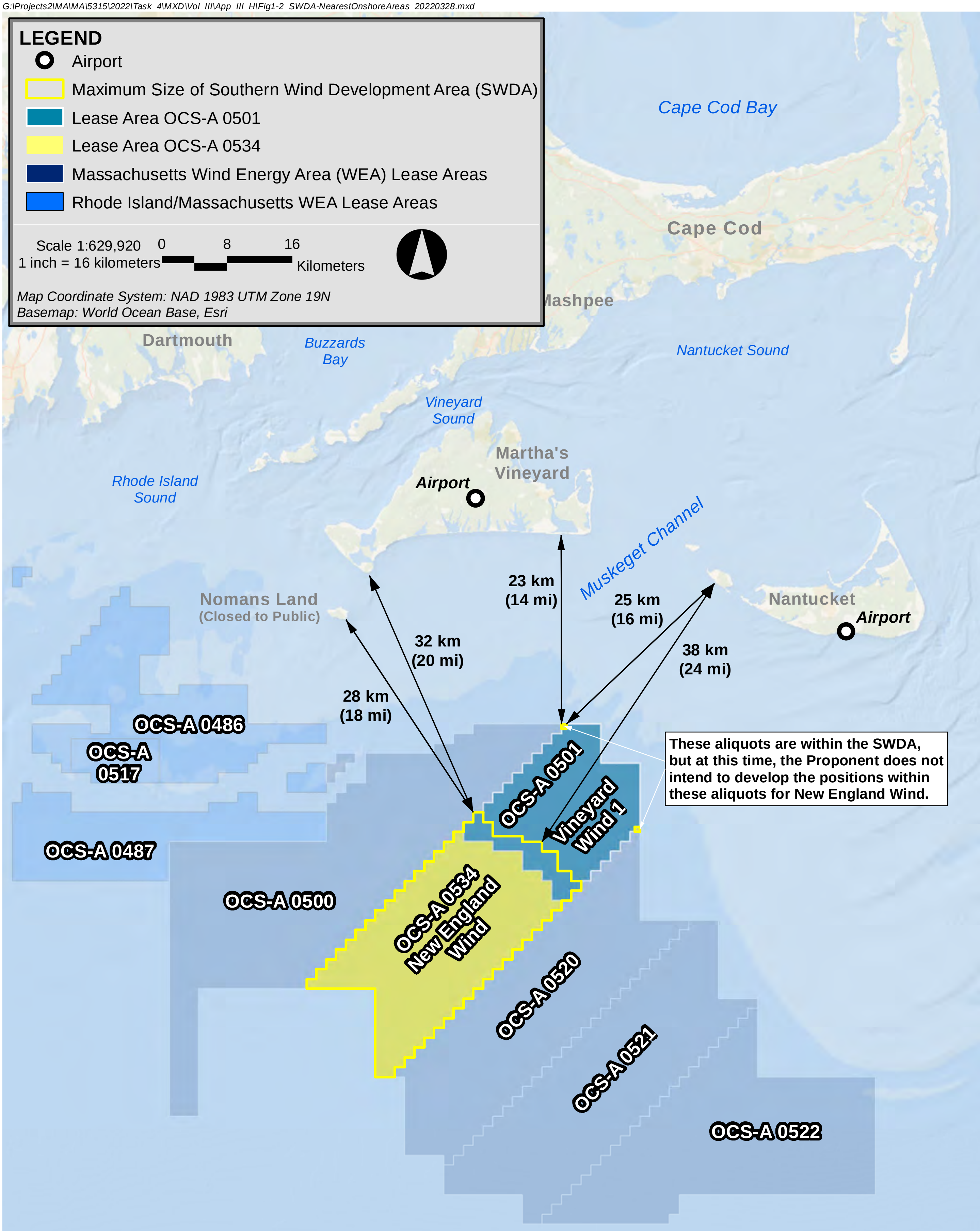

Figure 1.1-2
SWDA - Nearest Onshore Areas

1.2 Historic Property Treatment Plan (HPTP) and Section 106 of the National Historic Preservation Act (NHPA)

This Historic Property Treatment Plan (HPTP) has been developed in accordance with the Section 106 and Section 110(f) review (36 CFR 800) of the Undertaking and the 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 Memorandum of Agreement (MOA) with the BOEM, the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation (ACHP) regarding the New England Wind project.

The conditions of COP approval and MOA 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 conditions of COP approval and the MOA as well as with applicable local, state, and federal regulations and permitting requirements.

1.2.1 Municipal Regulations

Consistent with the 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 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 was utilized by BOEM to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). BOEM conducted a series of Section 106-specific meetings with consulting parties.

The Proponent has also conducted outreach meetings with various consulting parties to review the findings of the analysis to date and discuss proposed mitigation measures. These are parties that demonstrated interest in the affected historic property (Participating Parties). The Proponent has conducted outreach with the following parties:

- The Town of Aquinnah
- The Gay Head Lighthouse Advisory Committee
- The Wampanoag Tribe of Gay Head (Aquinnah)

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 Aircraft Detection Lighting Systems (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.

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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 2.0-1

Historic Property: Gay Head Lighthouse

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3.0 MITIGATION AND MINIMIZATION MEASURES

Mitigation and minimization 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 a 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:

- 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. This list will be based on the information included under "Scope of Work" and will be developed with input from the Town of Aquinnah and Gay Head Lighthouse Advisory Committee
- Description of proposed funding mechanism.
- Annual progress report to BOEM describing the implementation of the mitigation measures, if needed. (If the mitigation measure is limited to a one-time payment, an annual progress report is not expected to be required.)

Funds and Accounting

At present, it is envisioned that the Proponent will provide the Town of Aquinnah with a one-time payment of $200,000; the funds will be available to the Gay Head Lighthouse Advisory Committee to withdraw from for annual maintenance activities over the life of the lease.

3.2 Additional Minimization Measures

The Proponent is also implementing the following minimization 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

4.1 Timeline

It is anticipated that the proposed funding will be provided prior to construction for each Phase of New England Wind. The specific timeline prior to construction will be agreed upon by the Proponent and 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.

4.2 Organizational Responsibilities

4.2.1 Bureau of Ocean Energy Management (BOEM)

- BOEM is responsible for consultation related to dispute resolution if needed during implementation of the HPTP.

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 minimization measures (see Section 3.2).
- The Proponent will be responsible for considering the feedback provided by the parties identified.
- 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 Tribal Nations.
- Annual reporting to BOEM on implementation of the HPTP. (If the mitigation measure is limited to a one-time payment, an annual progress report from the Proponent is not expected to be required.)

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.

- If required, provide an annual report on annual maintenance activities to BOEM and/or the Proponent.

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 Tribal Nation.

4.2.6 Other Parties

The Proponent does not anticipate additional consulting parties.

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 8 – HISTORIC PROPERTY TREATMENT PLAN FOR VINEYARD SOUND AND MOSHUP'S BRIDGE TCP

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New England Wind Historic Property Treatment Plan for the Vineyard Sound and Moshup's Bridge 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.

February 2024

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EXECUTIVE SUMMARY

This Historic Property Treatment Plan (HPTP) for the Vineyard Sound and Moshup's Bridge Traditional Cultural Place (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 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 (ACHP) regarding the New England Wind project. The conditions of Construction and Operations Plan (COP) approval and the MOA 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 is consistent with, or equivalent to, those substantive baseline mitigation measures identified in the conditions of COP approval and MOA.

This HPTP includes the mitigation measures proposed by the Proponent for historic properties based on the evaluations and outreach performed by the Proponent.

The timeline for implementation of the mitigation measures has been determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP.

This HPTP 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 (New England 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 and through 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 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. 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 Area of Potential Effects (APE) 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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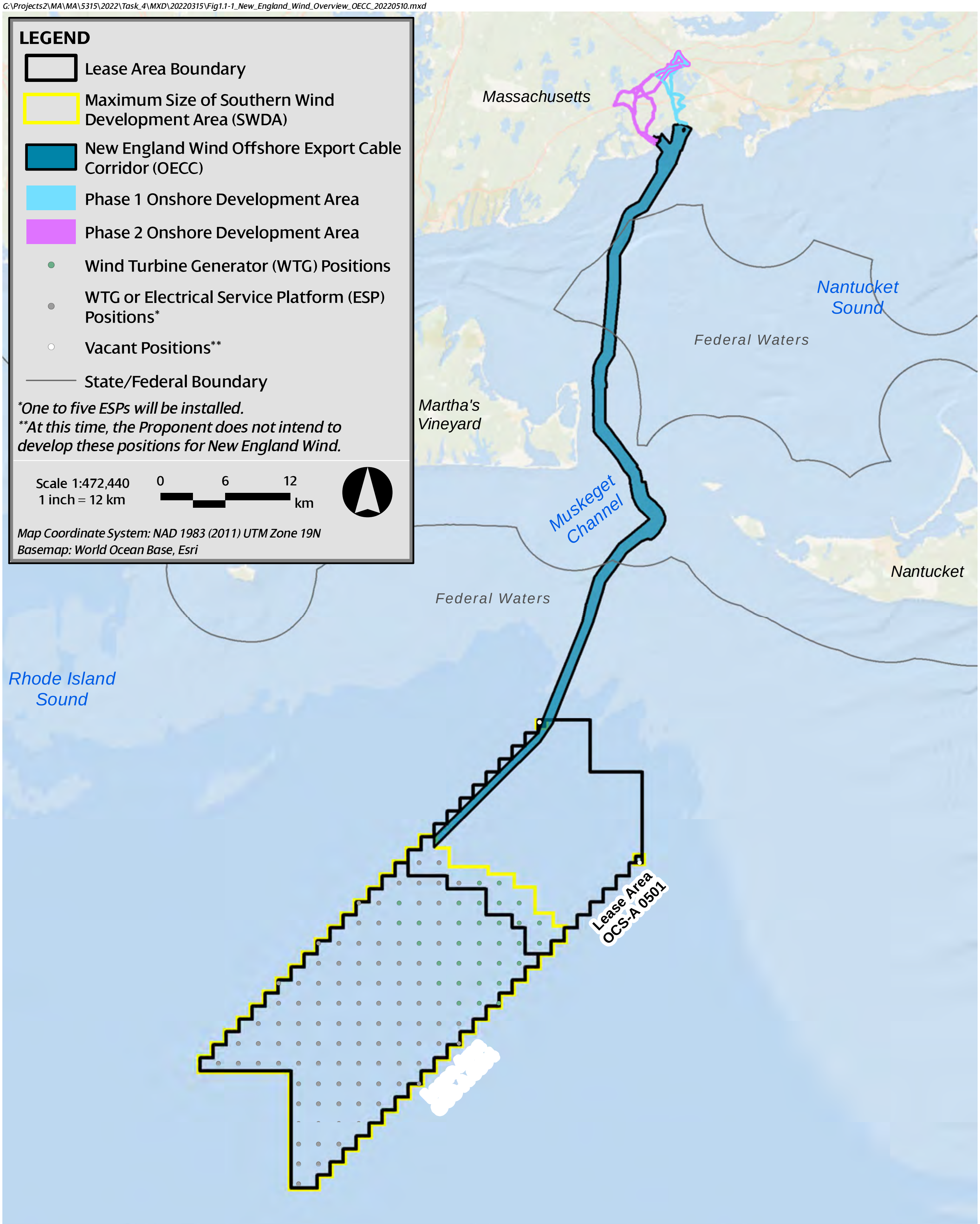

New England Wind
AVANGRID RENEWABLES

Figure 1.1-1
New England Wind Overview

G:\Projects2\MA\MA\5315\2022\Task_4\MXD\Vol_III\App_III_H\Fig1-2_SWDA-NearestOnshoreAreas_20220328.mxd

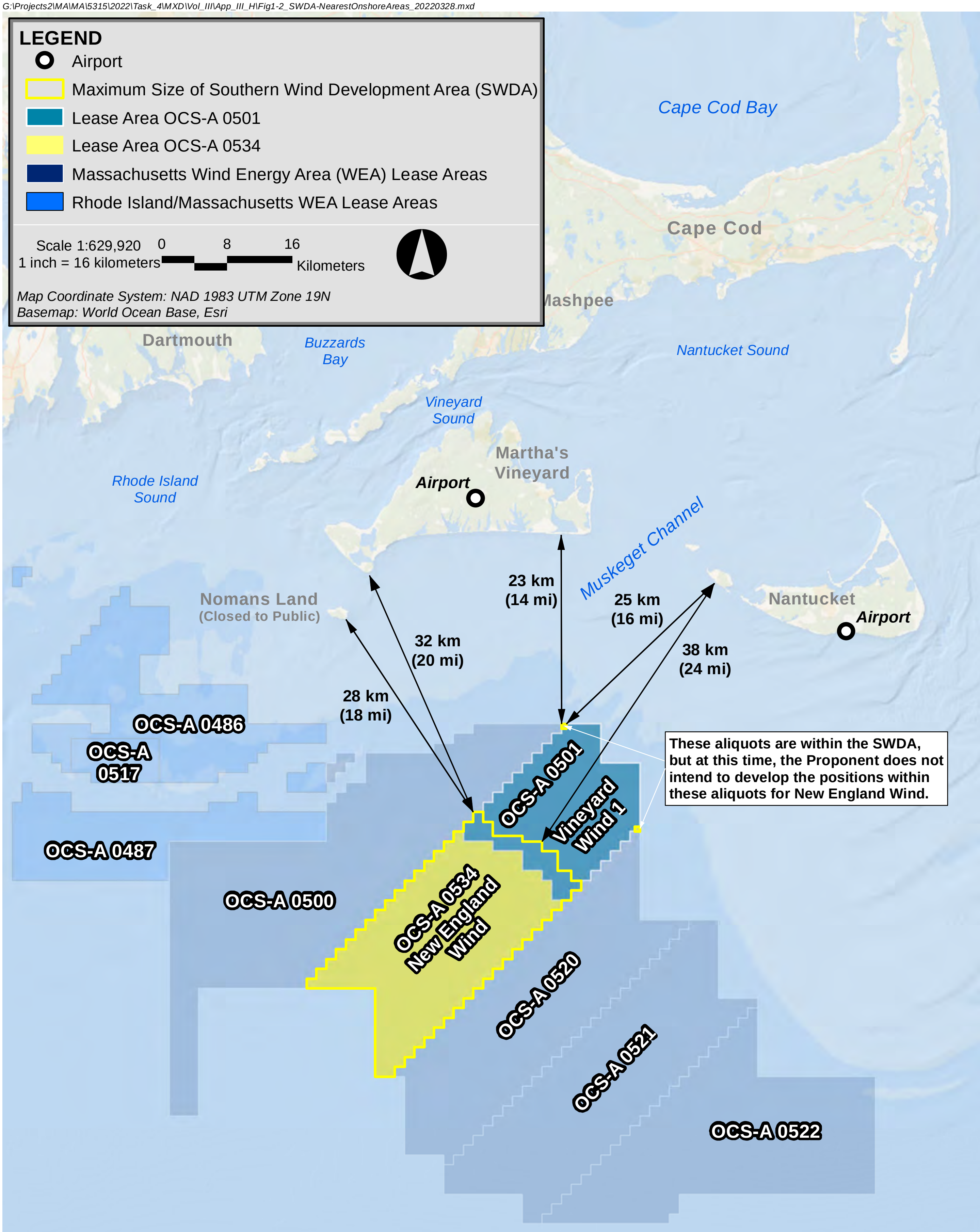

Figure 1.1-2
SWDA - Nearest Onshore Areas

1.2 Historic Property Treatment Plan (HPTP) and Section 106 of the National Historic Preservation Act (NHPA)

This Historic Property Treatment Plan (HPTP) has been developed in accordance with the Section 106 and Section 110(f) review (36 CFR 800) of the Undertaking and the 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 MOA with BOEM, the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation (ACHP), and participating Tribal Nations regarding the New England Wind project.

The conditions of COP approval and MOA 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 conditions of COP approval and the 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 was utilized by BOEM to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). BOEM conducted a series of Section 106-specific meetings with consulting parties and conducted an additional consulting party meeting with Tribal Nations.

The Proponent has also conducted outreach meetings with consulting parties to review the findings of the analysis to date and discuss proposed mitigation measures. These are parties that demonstrated interest in the affected historic property (Participating Parties). The Proponent has conducted outreach with the following parties:

- The Wampanoag Tribe of Gay Head (Aquinnah)
- The Mashpee Wampanoag Tribe
- The Town of Aquinnah
- The Massachusetts Board of Underwater Archaeological Resources (MBUAR)

2.0 SUMMARY OF HISTORIC PROPERTY (VINEYARD SOUND AND MOSHUP'S BRIDGE TRADTIONAL CULTURAL PLACE)

The Vineyard Sound and Moshup's Bridge Traditional Cultural Place (TCP) [redacted] The TCP is tied to the Wampanoag Nation creation story of geographical features within the area including the islands, shoals, and Vineyard Sound. The TCP is named for Moshup: a giant, teacher, and benevolent being responsible for the creation of the islands and waterways as well as Moshup's Bridge, which are shoals that run from Aquinnah to Cuttyhunk. Moshup is also responsible for geological features on Martha's Vineyard including the Gay Head Cliffs, which is a culturally significant location to the Aquinnah Tribe and the scene of continued cultural practices. [redacted]

The TCP is more fully described in a Historic Resources Visual Impact Assessment (VIA) prepared by another lessee, which describes the role of Moshup in creating Vineyard Sound, the Aquinnah Cliffs, and Nomans Land:

"In Aquinnah traditions, Moshup's long travels in ancient times wearied him. He dragged his toe as he strode from the area now known as Woods Hole towards the end of lands. The seas filled the deep furrow, forming Vineyard Sound and separating Noepe from the Elizabeth Islands (e.g. Sayet, 2012). Moshup made his home at the Aquinnah (Gay Head) Cliffs and gathered the Aquinnah people around him. He cast whales upon the shores of Aquinnah to provide for his people and the remains of his great meals created the bright colors of the clays and ancient bones and shells exposed along the cliffs' seaward margins.

Moshup taught the Aquinnah respect and charity, the expressions of which are associated with the continuing bounty of the seas and lands within and surrounding Aquinnah (WTGH/A website, 2020).

After some time Moshup, decided to build a bridge from Aquinnah to Cuttyhunk Island for use by the Aquinnah people (Perry, 2010). Challenged by the trickster Cheepee (Cheepi) to complete the bridge in one night, the Giant Moshup set to work, casting huge stones into the seas. Cheepee, concerned that Moshup would finish the bridge before sunrise, set a giant crab to attack the great giant as he waded in the waters. When the crab pinched Moshup's foot, the enraged giant cast the crab into the seas, forming Nomans Island (Perry, 2010). Undeterred, Cheepee tricked a crow by shining a bright torch before the sleeping bird's eyes, making him think the sun was rising. Upon hearing the crow's startled call, Moshup believed the dawn had broken and that he had failed Cheepee's challenge. The shoals between Aquinnah and Cuttyhunk are the remains of Moshup's great, if incomplete, bridge. Many variations of Moshup's story are told and retold by the Aquinnah people (Sayet, 2012). The centrality of Moshup's relationship to the landscape and seascape and the Aquinnah people's place within the world is expressed, in part, by an annual pageant for the celebration of the tribe's Moshup stories (NPS, 2010; Sayet, 2012; WTGH/A website, 2020)."

[redacted]

New England Wind
AVANGRID RENEWABLES

Figure 2.0-1
Historic Property: Vineyard Sound and Moshup's Bridge TCP

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The Vineyard Sound and Moshup's Bridge TCP is considered eligible for listing on the National Register under:

- Criterion A for its association with ancient and historic Native American exploration and settlement of Aquinnah, central events in Moshup's and the Aquinnah Tribe's history, and the character of the lands within;
- Criterion B for its association with Moshup;
- Criterion C as a distinguishable and significant component of Aquinnah lifeways, cosmology, economies, traditions, beliefs, and cultural practices; and
- Criterion D for its potential to yield information through archaeology, ethnography, and ethnohistory significant to understanding the Native American settlement, economies, land use, and cultural practices prior to and after the inundation of Vineyard Sound.

The maritime setting of this resource and its viewshed would be altered through the introduction of new elements. The TCP consists of a very large area with diverse landscapes including open water, shoreline areas, and heavily vegetated upland areas. As shown in the VIA (see photo simulations B-1a to B-1g of Appendix III-H.a of the New England Wind COP), the inland portions of the TCP will have limited visibility of the SWDA due to topographic changes and mature vegetation, with the vast majority of the inland area having no visibility of the SWDA. The TCP is approximately 27.0 km (16.8 mi) from the nearest WTG or ESP. The effect of visibility on the TCP is minimized by the size of the TCP itself, with only a portion of the TCP having visibility of the SWDA. However, as illustrated in the photo simulations in Appendix III-H.a, New England Wind will be visible across the seascape portion of the TCP, particularly in the area of the TCP between Martha's Vineyard and Nomans Land. As such New England Wind will change the character of the setting of the TCP. Due to the change of the TCP's setting, an adverse effect on the Vineyard Sound and Moshup's Bridge TCP has been determined.

There are a variety of mitigating factors affecting potential visibility of the SWDA and the adverse effect. Table 4-2 in Appendix III-H.b demonstrates that for the Gay Head Lighthouse (GAY. 900, within the proposed TCP and approximately 41.0 km [25.5 mi] from the closest New England Wind WTGs/ESP[s]), the average annual visibility of the WTGs/ESP(s) would be 18%. The average annual visibility was calculated assuming that New England Wind uses an Aircraft Detection Lighting System (ADLS) to control nighttime aviation obstruction lighting. The annual visibility from Gay Head Lighthouse does not account for other factors such as sea spray and low-contrast paint color, which will further reduce visibility. Additionally, the islands themselves will obscure visibility of the SWDA from portions within Vineyard Sound. Photo simulations B-1a to B-1g and C-1a to C-1d of the VIA (see Appendix III-H.a) show varying representative settings and potential visibility of the SWDA from within the TCP and demonstrate how the differing topography and vegetation within the TCP partially obscure visibility of the SWDA.

Nomans Land has visibility of the SWDA. Nomans Land, although vegetated, has a low elevation and the vegetation is not as dense or as tall as on the other islands. As mentioned previously, visibility from Nomans Land will be minimized due to distance, environmental factors, the proposed paint color, and the proposed ADLS. Further, Nomans Land is closed to the public, as it is a National Wildlife Refuge and a former bombing target with the presence of unexploded ordnance.

National Register Eligibility Criteria A, B, and D would not be affected by potential visibility of the SWDA. National Register Criterion C as it relates to the setting will be adversely affected by the SWDA. Please note that areas of particular significance such as the Gay Head Cliffs only have limited visibility at oblique angles as an observer viewing the Cliffs typically views them to the west in the opposite direction from the SWDA. Further, only one view from within the TCP would be affected—the southern view—while other views would be unaffected.

3.0 MITIGATION AND MINIMIZATION MEASURES

Mitigation and minimization measures for Vineyard Sound and Moshup's Bridge TCP are detailed below.

3.1 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 and state recognized Tribal Nations 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

The proposed total funding amount for mitigation measures described in Sections 3.1 through 3.2 is $500,000 for New England Wind. The funding amount presented is the total for both phases of New England Wind.

3.2 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 implementation 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 and state recognized Tribal Nations.

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

The proposed total funding amount for mitigation measures described in Sections 3.1 through 3.2 is $500,000 for New England Wind. The funding amount presented is the total for both phases of New England Wind.

3.3 Additional Minimization Measures

The Proponent is also implementing the following minimization 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 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

4.1 Timeline

It is anticipated that the mitigation measures identified in Sections 3.1 and 3.2 will commence prior to construction. The specific timeline prior to construction will be agreed upon by the Proponent and 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 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 consultation related to dispute resolution if needed during implementation of the HPTP.

4.2.2 Avangrid Renewables, LLC

- The Proponent will be responsible for implementing the HPTP.
- The Proponent will be responsible for considering the feedback 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 Tribal Nations.

4.2.3 Tribal Nations

- Identify resources of significance to support the public education mitigation measure (if selected).
- Provide feedback on draft materials within 45 days.

4.2.4 Other Parties

The Proponent does not anticipate additional consulting parties.

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 9 – HISTORIC PROPERTY TREATMENT PLAN FOR NANTUCKET SOUND TCP

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New England Wind
Historic Property Treatment Plan for the Nantucket Sound 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.

February 2024

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EXECUTIVE SUMMARY

This Historic Property Treatment Plan (HPTP) for the Nantucket Sound Traditional Cultural Place (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 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 (ACHP) regarding the New England Wind project. The conditions of Construction and Operations Plan (COP) approval and the MOA 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 is consistent with, or equivalent to, those substantive baseline mitigation measures identified in the conditions of COP approval and MOA.

This HPTP includes the mitigation measures proposed by the Proponent for historic properties based on the evaluations and outreach performed by the Proponent.

The timeline for implementation of the mitigation measures has been determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP.

This HPTP 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 (New England 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 and through 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 HPTP.

1.0 BACKGROUND INFORMATION

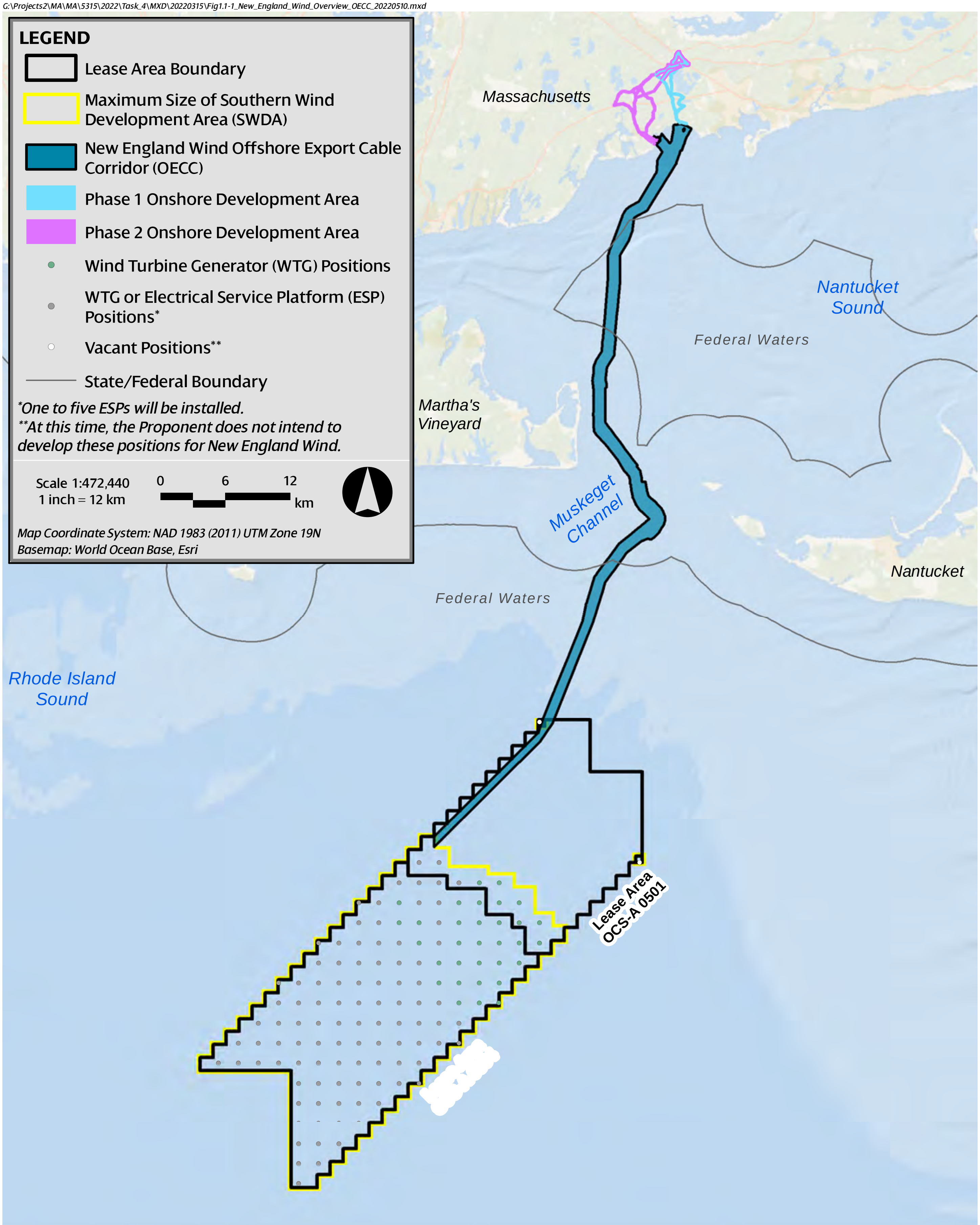
1.1 Project Overview

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. 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.

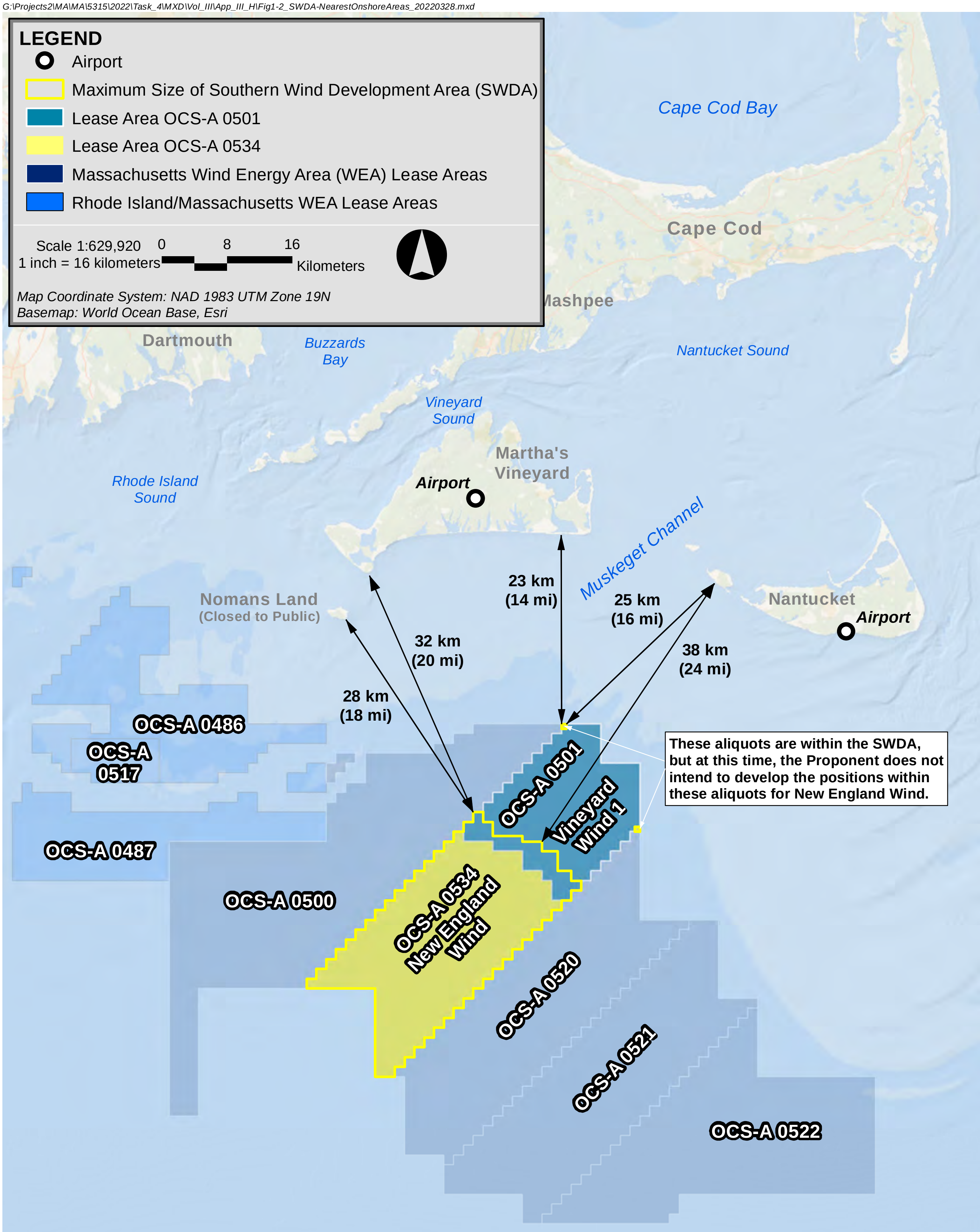
The Historic Properties Visual Impact Assessment (Appendix III-H.b of COP Volume III) for New England Wind is intended to assist BOEM and the Massachusetts Historical Commission (MHC), in its role as the State Historic Preservation Officer (SHPO), in their review of New England Wind under Section 106 of the NHPA and the National Environmental Policy Act. The Area of Potential Effects (APE) 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.

G:\Projects2\MA\MA\5315\2022\Task_4\MXD\20220315\Fig1.1-1_New_England_Wind_Overview_OECC_20220510.mxd



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) has been developed in accordance with the Section 106 and Section 110(f) review (36 CFR 800) of the Undertaking and the 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 Memorandum of Agreement (MOA) with BOEM, the Massachusetts State Historic Preservation Officer (MA SHPO), and the Advisory Council on Historic Preservation (ACHP), and participating Tribal Nations regarding the New England Wind project.

The conditions of COP approval and MOA 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 conditions 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 was utilized by BOEM to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)). BOEM conducted a series of Section 106-specific meetings with consulting parties.

The Proponent has also conducted outreach meetings with various consulting parties to review the findings of the analysis to date and discuss proposed mitigation measures. These are parties that demonstrated interest in the affected historic property (Participating Parties). The Proponent has conducted outreach with the following parties:

- The Wampanoag Tribe of Gay Head (Aquinnah)
- The Mashpee Wampanoag Tribe
- The Massachusetts Board of Underwater Resources (MBUAR)

2.0 SUMMARY OF HISTORIC PROPERTY (NANTUCKET SOUND TRADTIONAL CULTURAL PLACE)

Nantucket Sound has been determined eligible for listing on the National Register as a Traditional Cultural Place (TCP) by the Keeper of the National Register. Roughly bound by Vineyard Sound, Cape Cod, Martha's Vineyard, and Nantucket, the boundary for the National Register eligible property of Nantucket Sound as it relates to other waterways has not been fully defined (Figure 2.0-1). The Keeper in her review of eligibility criteria determined that:

"Nantucket Sound is eligible for listing in the National Register as a traditional cultural property and as an historic and archeological property associated with and that has yielded and has the potential to yield important information about the Native American exploration and settlement of Cape Cod and the Islands. Although the exact boundary is not precisely defined, this determination answers the question for the area that prompted the request for this determination, the Sound itself. The Sound is eligible as an integral, contributing feature of a larger district, whose boundaries have not been precisely defined, under:

- *Criterion A for its associations with the ancient and historic period Native American exploration and settlement of Cape Cod and the Islands, and with the central events of the Wampanoags' stories of Maushop and Squant/Squannit;*
- *Criterion B for its association with Maushop and Squant/Squannit;*
- *Criterion C as a significant and distinguishable entity integral to Wampanoags' folklife traditions, practices, cosmology, religion, material culture, foodways, mentoring, and narratives; and,*
- *Criterion D for the important cultural, historical, and scientific information it has yielded and/or may be likely to yield through archeology, history, and ethnography about access to resources, patterns of settlement, mobility, and land use prior to and after 6,000 years ago as a result of the inundation of the Sound. It is also important for the significant information it provides and can provide about the cultural practices and traditions of the Native Americans of Cape Cod and the Islands in relationship with other peoples since ancient times."*

Photo simulations from Nantucket (see photo simulations B-5a to B-5e in Appendix III-H.a) demonstrate that the SWDA will be visible at the extreme southern end of Nantucket Sound. Views of Nantucket Sound to the north, east, and west from within the Sound will not be affected. For large sections of Nantucket Sound, the SWDA will not be visible. 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 the Wasque Reservation, which is within the Chappaquiddick Island TCP, are also representative of the views from the Nantucket Sound TCP at its southernmost end. The Chappaquiddick Island TCP/Nantucket Sound TCP is located approximately 23.1 miles from the closest WTG. On average for all meteorological conditions, New England Wind

WTGs/ESP(s) might be visible 22% of the time from the Chappaquiddick Island TCP (including the Wasque Reservation), which is representative of visibility from Nantucket Sound. While significant viewsheds will not be altered, it is conservatively determined that an adverse effect may occur.

Additionally, the offshore export cable corridor (OECC) for New England Wind passes through the Nantucket Sound TCP. Potential submerged ancient landforms (SALs) have been identified within portions of the OECC where it passes through the Nantucket Sound TCP. 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]

Figure 2.0-1

Historic Property: Nantucket Sound TCP

3.0 MITIGATION AND MINIMIZATION MEASURES

Mitigation and minimization measures are proposed below, however; ongoing consultation has informed the importance of SALs and the SAL study proposed below and detailed in the SAL HPTP in Attachment 4 of the MOA will serve as the main focus of mitigation for the Nantucket Sound TCP.

3.1 Mitigation Measures

3.1.1 Submerged Ancient Landform (SAL) Study

As noted in Section 2.0, potential SALs have been identified within portions of the OECC where it passes through the Nantucket Sound 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 in Attachment 4 of the MOA, as well as in the Marine Archaeological Resources Assessment included as Volume II-D of the COP.

3.2 Minimization Measures

3.2.2 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.

3.2.3 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.

3.2.4 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

4.1 Timeline

It is anticipated that the mitigation measures identified in Section 3.1 will commence prior to construction. The specific timeline prior to construction will be agreed upon by the Proponent and 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 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 consultation related to dispute resolution if needed during implementation of the HPTP.

4.2.2 Avangrid Renewables, LLC

- The Proponent will be responsible for implementing the HPTP.
- The Proponent will be responsible for considering the feedback 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 Tribal Nations.

4.2.3 Tribal Nations

Tribal Nations to provide feedback on draft materials associated with the SAL study (if applicable) within 45 days.

4.2.3 Other Parties

The Proponent does not anticipate additional consulting parties.

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.

October 2023

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1.0 INTRODUCTION

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. Five offshore export cables will transmit electricity generated by the WTGs to onshore transmission systems in the Town of Barnstable, Massachusetts. 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 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. The TARA is provided as Appendix III-G in Volume III of the New England Wind COP submitted to the Bureau of Ocean Energy Management (BOEM). Preparation of the remaining reports to be included in the TARA is ongoing while property access permissions are acquired to conduct additional Phase 1A and Phase 1B archaeological investigations. 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 (PIP) for Terrestrial Archaeology 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. Section IV of the Memorandum of Agreement (MOA) describes the 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.

New England Wind is fully described in Volume I of the COP and includes two Phases. Phase 1 potential Onshore Export Cabling Routes and Grid Interconnection 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.

Phase 2 potential Onshore Export Cable Routes are sited along existing roadways or utility ROWs and will be installed underground. Wherever possible, expanded work zones and construction staging areas along the potential Onshore Export Cable 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.

Figure 1.1-1 indicates where Phase 1A and/or Phase 1B terrestrial archaeology surveys 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, and these proposed survey areas are shown on Figure 1.1-2. The following sections of this PIP focus on the outstanding terrestrial archaeological survey and reporting needs for the Phase 1 and Phase 2 Onshore PAPE.

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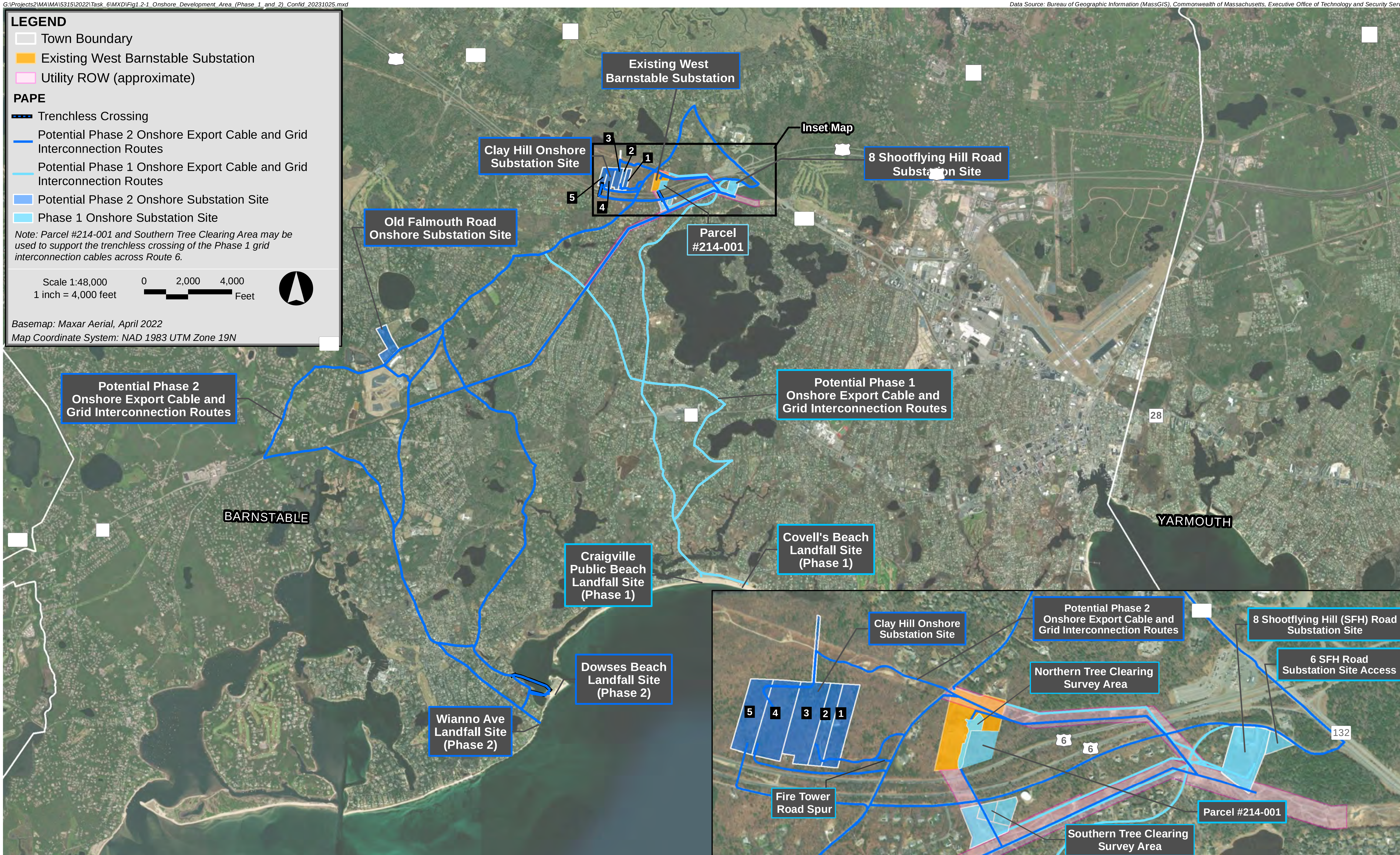
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



New England Wind

AVANGRID RENEWABLES

Figure 1.1-1

Overview of Existing Terrestrial Archaeology Survey Areas for Phases 1 and 2

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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 1.1-2

Remaining Terrestrial Archaeology Survey Areas for Phase 1 and Phase 2

2.0 PHASED IDENTIFICATION

2.1 Section 106 Phased Identification Plan (PIP)

2.1.1 Phased Identification

After 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 (see Figure 1.1-2):

- Phase 1 – Phase 1B Survey of Eversource ROW #343, #345, and #381
- Phase 2 – Phase 1B Survey of Western Workspace and Eastern Workspace associated with a potential trenchless crossing of East Bay
- Phase 2– Phase 1B Survey of small segment of Fire Tower Road
- Phase 2 – Phase 1B Survey of Additional Phase 2 Onshore Cable Route Segments (Eversource ROW #342 Survey Area and MassDOT ROW Survey Area)
- Phase 2 – Phase 1B Survey of the Old Falmouth Road onshore substation site

The anticipated schedule is described further in Section 2.2.

2.1.2 Scope of Phased Identification

<u>**Overview**</u>

As detailed above, most Phase 1 and Phase 2 terrestrial archaeology assessments have been completed. A PIP is necessary for limited work associated with Phase 1 and Phase 2.

<u>**Phase 1**</u>

For Phase 1 of the Project, a Phase 1B Survey will be needed for the areas identified where grid interconnection may be possible. The areas remaining are owned by Eversource and require the Proponent be granted access to complete the survey. They are identified on Figure 1.1-2 as Eversource ROW #381, 345, and 343 Survey Areas.

<u>**Phase 2**</u>

For Phase 2 of the Project, a Phase 1B Survey will be conducted at two workspaces (see Figure 1.1-2) affiliated with the potential trenchless crossing of East Bay: Western Workspace and Eastern Workspace.

A Phase 1B survey will be conducted on a small segment of Fire Tower Road with moderate archaeological sensitivity where previous testing was not conducted as property access was not available.

Additionally, a Phase 1B Survey may be conducted at two potential onshore cable route segments in the immediate vicinity of the Clay Hill onshore substation site that may be used Figure 1.1-2 identifies these two additional segments as Eversource ROW #342 Survey Area and MassDOT ROW Survey Area. The areas remaining are owned by Eversource and MassDOT and require the Proponent be granted access to complete the survey. The Eversource ROW #342 Survey Area and MassDOT ROW Survey Area are less likely to be used and a survey will only be conducted if the Proponent determines that use of these segments is required.

Finally, a Phase 1B Survey may be conducted at the Old Falmouth Road onshore substation site. 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. Additionally, if the Old Falmouth Road onshore substation site is selected for use, the Proponent would also conduct GIS-based viewshed modeling.

The remaining Phase 1B Surveys will be completed in accordance with the schedule in Section 2.2.

Description of Survey Types and Methods

A Phase 1B Survey will be completed in zones of high and moderate sensitivity with 50-x-50-cm shovel test pits placed at 10-m intervals along judgmentally placed transects. Some test pits may be placed in zones of low archaeological sensitivity to confirm that ranking (see Appendix B). If cultural material is found, additional test pits will be excavated at 2.5- or 5-m intervals in the cardinal direction around the test pits containing pre-contact cultural material. As part of the planned Phase 1B Surveys, National Register 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 Attachment 12 of the MOA). This plan will be followed and implemented during all planned studies described in this PIP.

2.2 Schedule

Table 2.2-1 provides the anticipated NEPA/Section 106 milestones. Outstanding survey work included in this PIP will be conducted following the issuance of the ROD and MOA. These surveys following the ROD and MOA will only be completed if the Proponent secures property access and intends to impact these areas with Phase 1 and Phase 2 construction.

Table 2.2-1 Anticipated NEPA/Section 106 Milestones

Upcoming NEPA/Section 106 Milestones	
Final Environmental Impact Statement Published	Anticipated November 24, 2023
Record of Decision/Memorandum of Agreement	Anticipated December 26, 2023
Phased Identification Surveys and TARA Addendum	Anticipated post-ROD

APPENDIX A SENSITIVITY MAPS AT AREAS INCLUDED IN THIS PIP

Note: Appendix A provides the sensitivity maps of the remaining sites that may require further investigation. Proposed surveys will only take place in areas mapped as moderate or high sensitivity.

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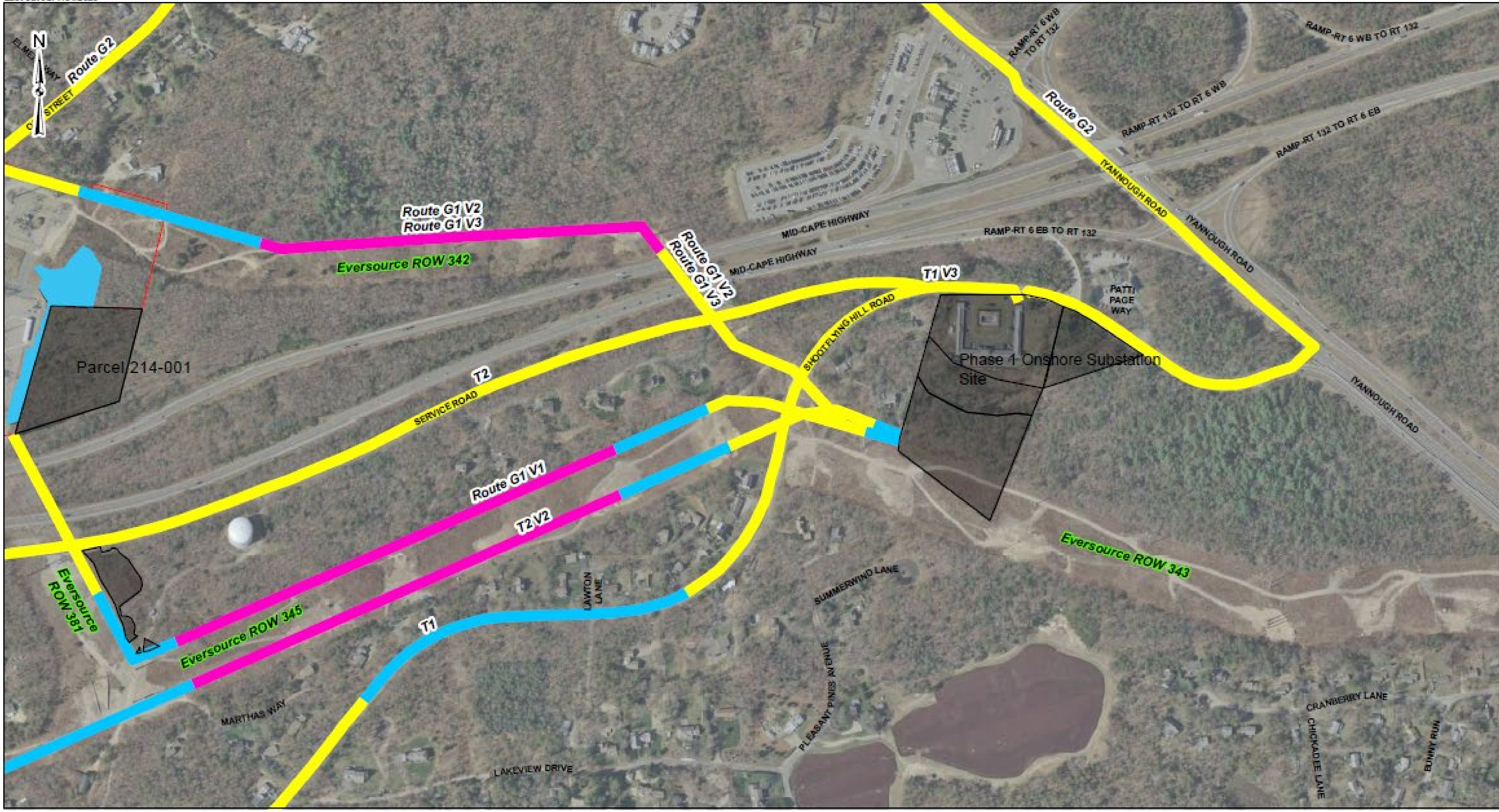

New England Wind Phase 1
(Park City Wind)/New England Wind Connector 1
Barnstable, Massachusetts

PAL: due diligence / assessment	5-22-2020
Epsilon: routes and parcels	4-20-2020
Basemap: USGS via ArcGIS Online	various

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THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

KEY:

Existing West Barnstable Substation

Archaeological Assessment:

- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

Green labels indicate remaining survey areas

0 200 400 600
Feet

1:4,000

0 100 200
Meters

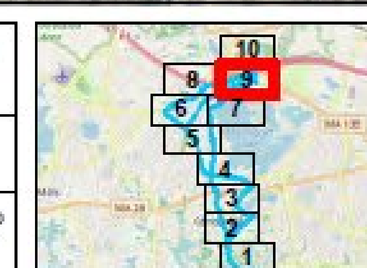


Figure A-1: Phase 1 Remaining Survey Needs and Zones of Archaeological Sensitivity

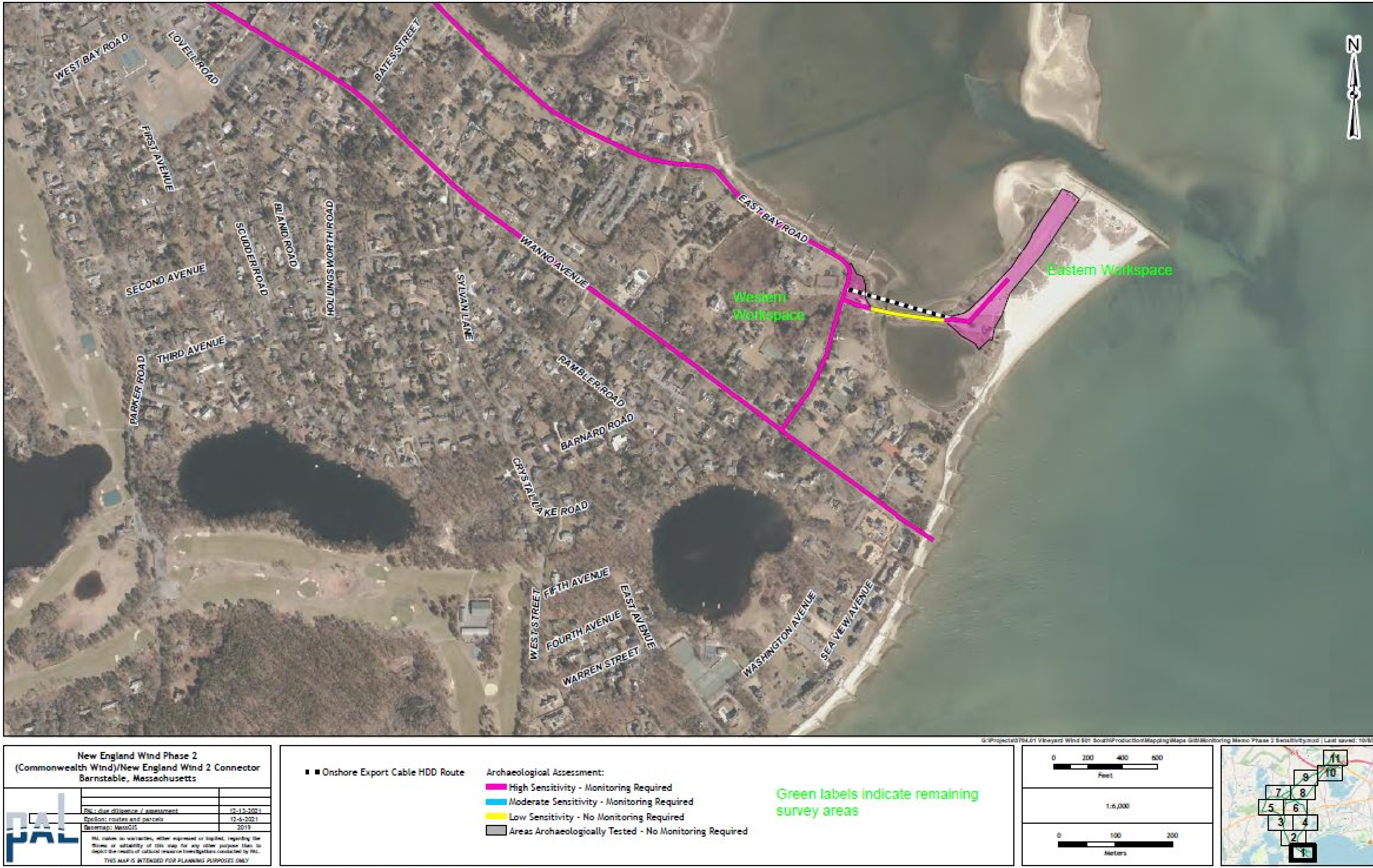
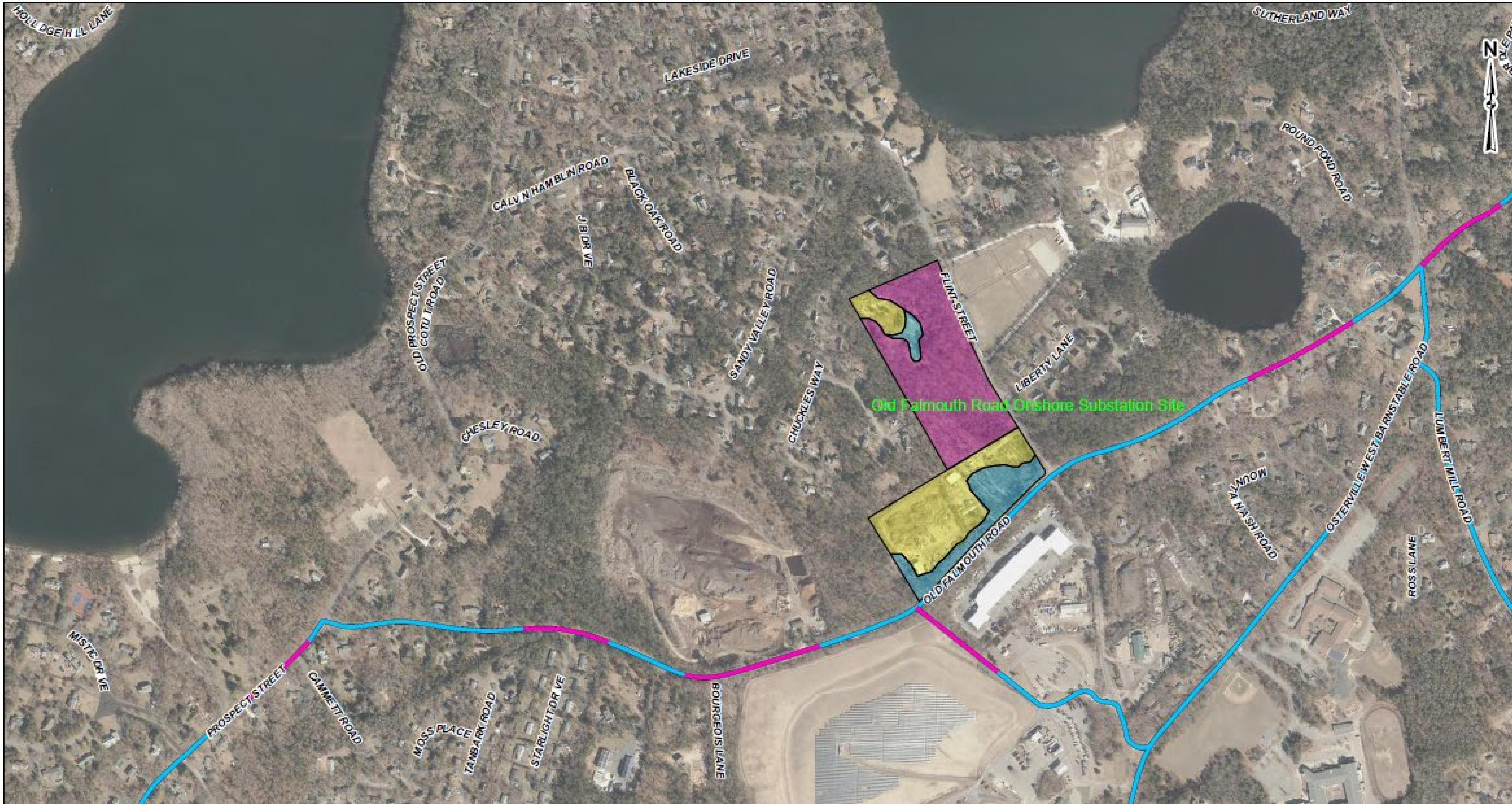


Figure A-2 : Phase 2 Remaining Survey Needs and Zones of Archaeological Sensitivity.



New England Wind Phase 2
(Commonwealth Wind)/New England Wind 2 Connector
Barnstable, Massachusetts

PAL: due diligence / assessment	12-13-2021
Epsilon: routes and parcels	12-6-2021
Basemap: MassGIS	2019

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THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

Onshore Export Cable HDD Route

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

Green labels indicate remaining survey areas

0 200 400 600
Feet

1:6,000

0 100 200
Meters

Figure A-3 : Phase 2 Remaining Survey Needs and Zones of Archaeological Sensitivity.

New England Wind Phase 2
(Commonwealth Wind)/New England Wind 2 Connector
Barnstable, Massachusetts

PAL: due diligence / assessment	12-13-2021
Epsilon: routes and parcels	12-6-2021
Basemap: MassGIS	2019

PAL makes no warranties, either expressed or implied, regarding the fitness or suitability of this map for any other purpose than to depict the results of cultural resource investigations conducted by PAL.

THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

Onshore Export Cable HDD Route

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

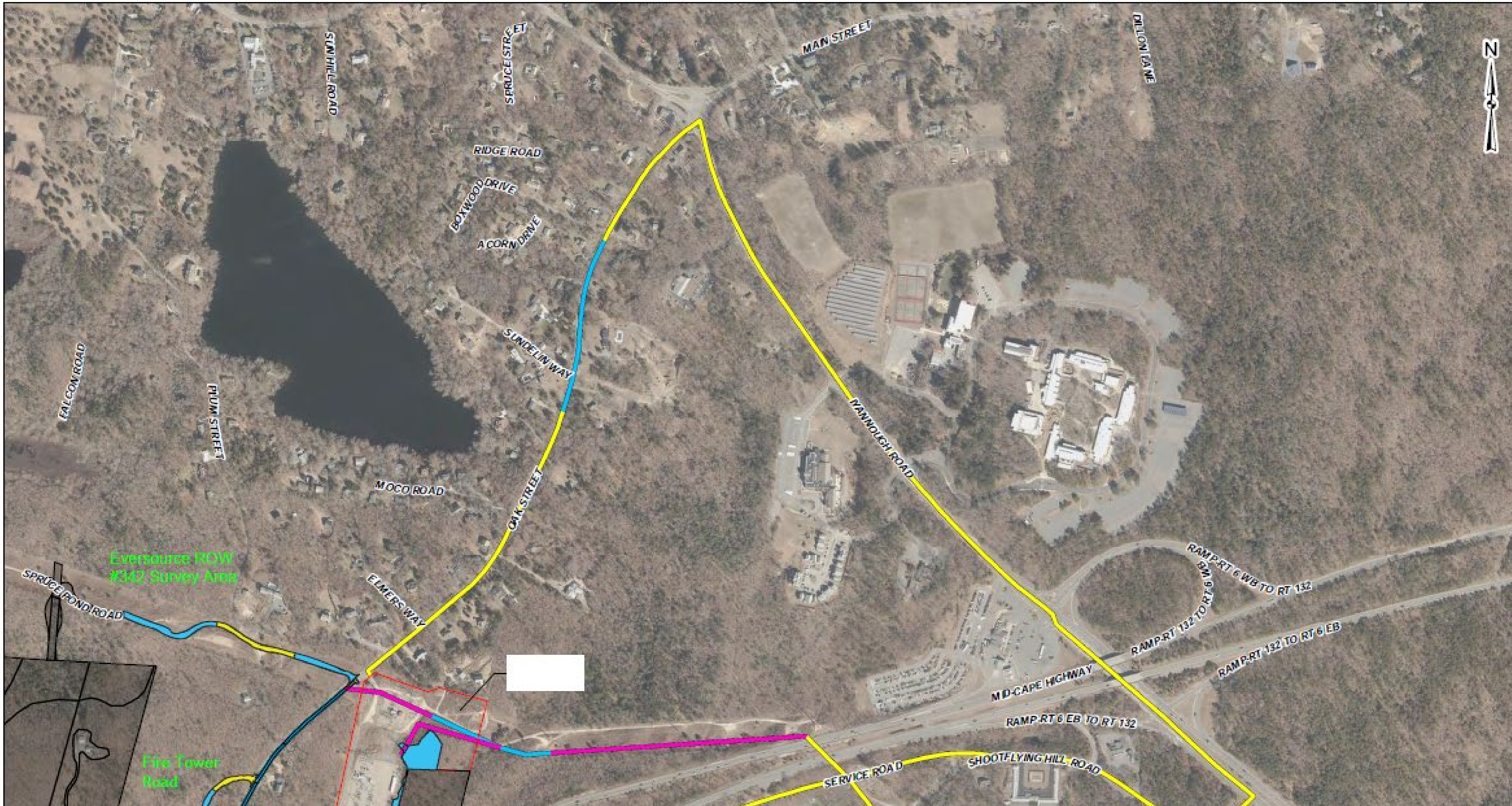
Green labels indicate remaining survey areas

0 200 400 600 Feet

1:6,000

0 100 200 Meters

Figure A-4 : Phase 2 Remaining Survey Needs and Zones of Archaeological Sensitivity.



New England Wind Phase 2 (Commonwealth Wind)/New England Wind 2 Connector
Barnstable, Massachusetts

PAL: due diligence / assessment	12-13-2021
Epsilon: routes and parcels	12-6-2021
Basemap: MassGIS	2019

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Onshore Export Cable HDD Route

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

Green labels indicate remaining survey areas

0 200 400 600 Feet

1:6,000

0 100 200 Meters

Figure A-5 : Phase 2 Remaining Survey Needs and Zones of Archaeological Sensitivity..

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ATTACHMENT 11 – NEW ENGLAND WIND TERRESTRIAL UNANTICIPATED DISCOVERY PLAN

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Procedures Guiding the Discovery of Unanticipated Onshore Archaeological Resources and Human Remains

for the

New England Wind Phase 1 and 2 Project

Barnstable, Massachusetts

Submitted to:

Bureau of Ocean Energy Management

U.S. Department of the Interior

Prepared for:

Park City Wind LLC

Prepared by:

The Public Archaeology Laboratory, Inc.

https://www.palinc.com/

October 2023

Introduction

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. Five offshore export cables will transmit electricity generated by the WTGs to onshore transmission systems in the Town of Barnstable, Massachusetts. Park City Wind LLC, a wholly owned subsidiary of Avangrid Renewables, LLC, is the Proponent and will be responsible for the construction, operation, and decommissioning of New England Wind.

Phase 1 of New England Wind, which includes Park City Wind, will be developed immediately southwest of the Vineyard Wind 1 project. Two high-voltage alternating current (HVAC) offshore export cables will transmit electricity to a landfall site 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, which includes Commonwealth Wind, will be immediately southwest of Phase 1 and will occupy the remainder of the Lease Area. Three HVAC offshore export cables will transmit electricity to landfall sites at Dowses Beach and/or Wianno Avenue in Barnstable, Massachusetts. Onshore export cables (connecting the landfall site[s] to the Phase 2 Clay Hill onshore substation site or, alternatively, the Old Falmouth Road site) 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). 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. 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, archaeologists and tribal monitors will be on-site monitoring construction (see Onshore Archaeological Monitoring Plan for the New England Wind Phase 1 and 2 Project). 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 Tribal Nations. 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

- National Historic Preservation Act of 1966, as amended (54 USC 306108), specifically Sections 110 and 106 and implementing regulations at 36 CFR 800.
- Secretary of the Interior's Standards for Archeology and Historic Preservation (48 CFR 44716-42);
- Advisory Council on Historic Preservation *Policy Statement on Burial Sites, Human Remains, and Funerary Objects* 2023.

- Advisory Council on Historic Preservation *Policy Statement on Burial Sites, Human Remains, and Funerary Objects: Explanation and Discussion* 2023.

Massachusetts

- Massachusetts General Laws Chapter 9 Sections 26A through 27C, as amended, and regulations at 950 CMR 70 and 71.
- 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 Historical Commission: *KnowHow #4 What to do when Human Burials are Uncovered* (no date)
- Massachusetts Historical Commission: *Policy for Disposition of Non-Native Human Remains Which Are Over 100 Years Old or Older* (1990)

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, Tribal Nations, specifically the Mashpee Wampanoag Tribe, the Wampanoag Tribe of Gay Head/Aquinnah, and the Mashantucket (Western) Pequot Tribal Nation, and other interested stakeholders. All contact information for the SHPO, and the Tribal Nations and other stakeholders is listed in this plan. In the event any archaeological resources and/or human remains are encountered during construction of the Project, the Proponent and their cultural resource consultant will contact the relevant parties, as set forth in these Procedures.

Contractor Training

The Proponent will inform the consulting Tribal Nations 30 days in advance of the contractor training schedule. Consulting Tribal Nations will participate in the contractor training if, within the 30-day window, they confirm it is necessary and that they are available to participate. Basic training is required to identify potential archaeological sites. The Proponent 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. The archaeological consultants and tribal representatives, if participating as described above, will prepare and give the Proponent and its contractor construction supervisors cultural and archaeological sensitivity training before the start of onshore construction so that the Proponent and their contractors are aware of the types of archaeological resources that may be encountered during construction. The purpose of this training will be to review state and federal regulations concerning archaeological resources and the general results of the archaeological investigations conducted within the onshore portions of the Project APE including types of artifacts and resources that may be present, provide an overview of the general and tribal cultural history of the area, and introduce contractors to the archaeological and tribal monitors. The procedures that will be followed if a significant cultural resource or archaeological deposit is discovered during construction will be reviewed during the training. Hard copies of this Archaeological Monitoring Plan will be printed and circulated to contractor supervisors at the contractor training for incorporation into construction documentation. Construction crews will be required to review the plan and have it with them during all construction activities.

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. 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.

2. 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.

3. Upon notification or discovery of a possible archaeological site, the Resident Engineer will contact the Proponent's cultural resource consultants 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.

4. If on-site archaeological investigations are required, the archaeologist will inform the Resident Engineer who then will inform the construction Contractor. The Proponent, the consulting Tribal Nations, the SHPO, and BOEM and BSEE 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.

5. If the archaeologist determines a site visit is not required as the reported discovery is found to not be a potentially significant archaeological resource, the archaeologist will notify the Resident Engineer who will then notify the Contractor to resume work. If the archaeologist determines a site visit is required, the archaeologist and representatives of the consulting Tribal Nations will conduct a review of the discovery site. 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.

6. The archaeologist and the representatives of the Tribal Nations, if present, 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, PAL, and the representatives of the Tribal Nations will work with the SHPO to ensure that a treatment plan

for the site is developed and implemented as quickly as possible. BOEM and BSEE will be notified of the results of the discovery review to facilitate consultations.

7. If the site is determined to be a significant archaeological resource threatened by onshore construction for the Project, the archaeologist at the direction of the Proponent and in consultation with the SHPO, BOEM and BSEE and the consulting Tribal Nations and any other relevant consulting parties, will develop and implement under a State Archaeologist's permit (950 CMR 70) a site mitigation plan.

8. The duration of any work stoppage will be contingent upon the significance of the identified cultural resource(s) and consultation among the Proponent, BOEM and BSEE, MHC, Tribal Nations, and other consulting parties to determine treatment to avoid, minimize, or mitigate adverse effects to the identified site.

9. Once all consulting parties have agreed that the treatment measures are complete, the Proponent's Resident Engineer will notify the contractor that construction work may proceed. The contractor will not resume work in the vicinity of the find until the Resident Engineer has granted clearance.

Discovery of Human Remains Protocol

If human remains are encountered during Project construction, they will be handled in accordance with the MHC's *KnowHow #4* (Appendix A) and guided by the policy statement adopted by the ACHP (*Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects* (Appendix B). 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.

Human remains will be treated with dignity and respect at all times. Skeletal remains and/or associated artifacts will be left in place and not disturbed. No remains or associated materials will be collected or removed until all notifications have been made, appropriate consultation has taken place, and a plan of action has been determined. The procedures that will be followed if human remains are unearthed during Project construction are:

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 Proponent and the archaeologist.

3. The archaeologist and the Proponent will be responsible for notifying the Office of the Chief Medical Examiner (OCME), the State Police, the State Archaeologist and BOEM and BSEE. If the archaeologist determines that the remains are obviously human and recent, this will be communicated to all the contacts, including the OCME. If the 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.

4. If the Medical Examiner determines the remains are less than 100 years old, their treatment becomes the responsibility of the State Police. If the Medical Examiner determines the remains are more than 100 years old, the Medical Examiner will notify the Massachusetts State Archaeologist. The Project Proponent and their archaeological consultant will notify the consulting Tribal Nations. The State Archaeologist will notify the Massachusetts Commission on Indian Affairs (MCIA) Commissioner. The State Archaeologist, the MCIA Commissioner, the Proponent's archaeological consultant, and representatives from the consulting Tribal Nations will determine if the remains are Native American

5. The Proponent, BOEM, BSEE, the State Archaeologist, and if the remains are Native American, the MCIA and the consulting Tribal Nations representatives will discuss whether there are prudent and feasible alternatives to protect the remains. The results of this consultation will be made in writing. If it is not possible to protect the remains, they may be excavated only under a Special Permit issued by the MHC after the review of a recovery plan that specifies a qualified research team, research

design, and plan for the disposition of the remains consistent with the results of consultation 950 CMR 70.20(2) and the Memorandum of Agreement for the Project.

6. 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 BSEE 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).

7. In all cases, due care will be taken in the excavation, transport, and storage of any remains to ensure their security and respectful treatment.

LIST OF CONTACTS

Park City Wind, LLC

125 High Street

Boston, MA 02110

Contact: Mark Roll, Federal Permitting Manager, Offshore

Avangrid Renewables

Tel: (857) 301-0820

Email: mark.roll@avangrid.com

Massachusetts Historical Commission

220 Morrissey Boulevard

Boston, Massachusetts 02125

Contact: Brona Simon, State Historic Preservation Officer

Tel: (617) 727-8470

Email: 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

(617) 573-1292

Email: john.peters@state.ma.us

Massachusetts State Police, South Yarmouth Barracks

1172 State Road

South Yarmouth, MA

Tel: (508) 398-2323

Barnstable Police Department

1200 Phinneys Lane

Hyannis, MA

Tel: (508) 775-0387

Office of the Chief Medical Examiner, Sandwich Office

1 Simpkins Road

Mashpee, MA 02649

Tel: (508) 539-2200

TRIBAL NATIONS

Mashpee Wampanoag

483 Great Neck Road South

Mashpee, MA 02649

Contact: David Weeden, Tribal Historic Preservation Officer

Tel: (508) 477-0208, Ext. 102

Email: David.weeden@mwtribe-nsn.gov

Wampanoag Tribe of Gay Head/Aquinnah

20 Black Brook Road

Aquinnah, MA 02535-1546

Contact: Bettina Washington, Tribal Historic Preservation Officer

Tel: (508) 560-9014

Email: thpo@wampanoagtribe-nsn.gov

Mashantucket (Western) Pequot Tribal Nation

110 Pequot Trail

Mashantucket, Connecticut 06338

Contact: Michael Kickingbear Johnson, Tribal Historic Preservation Officer

Tel: 860-396-7575

Email: mejohnson@mptn-nsn.gov

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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
Examiner 720 Albany St.
Boston, MA 02118
Phone: (617)-267-6767

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Brona Simon
State Historic Preservation Officer & Executive Director
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Environmental Police
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ATTACHMENT 13 – NEW ENGLAND WIND ONSHORE ARCHAEOLOGICAL MONITORING PLAN

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Onshore Archaeological Monitoring Plan

for the

New England Wind Phase 1 and 2 Project

Barnstable, Massachusetts

Submitted to:

Bureau of Ocean Energy Management

U.S. Department of the Interior

Prepared for:

Park City Wind LLC

Prepared by:

The Public Archaeology Laboratory, Inc.

https://www.palinc.com/

October 2023

TABLE OF CONTENTS

LIST OF FIGURES

1.0 EXECUTIVE SUMMARY

This Onshore Archaeological Monitoring Plan provides background data, a summary of previous cultural resources investigations, and the detailed steps archaeological monitors will implement during construction of onshore cable duct route segments and horizontal directional drilling (HDD) within moderate and high archaeologically sensitive areas of New England Wind Phases 1 and 2 in Barnstable, Massachusetts. This Onshore Archaeological Monitoring Plan identifies specific areas of proposed archaeological monitoring and outlines the notification process if construction or drilling exposes potentially significant archaeological properties. This plan is developed in accordance with the National Historic Preservation Act (NHPA) (54 USC 300101, et seq.) and Massachusetts General Laws Chapter 9 Sections 26A through 27C.

This plan complements other cultural resource plans prepared for the onshore components of the Project including Historic Property Treatment Plans for the Nantucket Sound and Chappaquiddick Island Traditional Cultural properties and *Procedures Guiding the Discovery of Unanticipated Archaeological Resources and Human Remains* (2023).

2.0 BACKGROUND INFORMATION

2.1 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. Five offshore export cables will transmit electricity generated by the WTGs to onshore transmission systems in the Town of Barnstable, Massachusetts. Figure 2.1-1 provides an overview of the New England Wind project. Park City Wind LLC, a wholly owned subsidiary of Avangrid Renewables, LLC, is the Proponent 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 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.

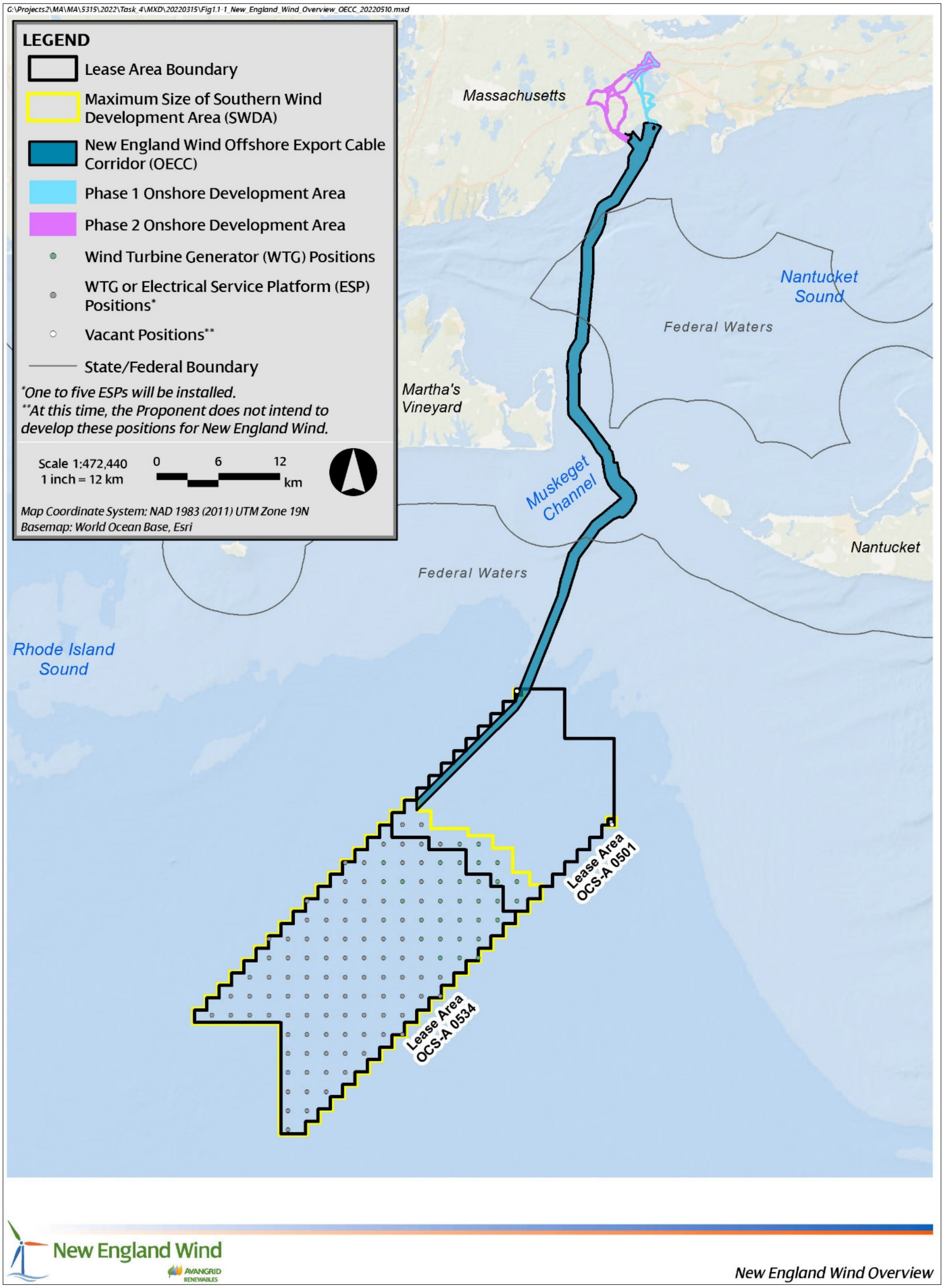

Figure 2.1-1. New England Wind Overview.

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 km^2 (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).

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 landfall site(s) to one new onshore substation in the Town of Barnstable. Grid interconnection cables will then connect the onshore substation site to the West Barnstable Substation.

2.2 Section 106 of the National Historic Preservation Act

Since the Project requires approval from BOEM, it is considered a federal undertaking and as such, must comply with Sections 106 and 110 of NHPA, as amended, and the National Environmental Policy Act of 1970 (NEPA). Section 106 of the NHPA requires federal agencies to identify and assess the effects of undertakings on historic resources and to resolve adverse effects by developing and evaluating alternatives that could avoid, minimize, or mitigate these impacts. Section 110 of the NHPA requires federal agencies to establish a historic preservation program for the identification, evaluation, and protection of historic properties under their control or ownership within an Area of Potential Effect (APE). An APE, as defined by 36 CFR § 800.16(d), is "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. Areas of potential effect are influenced by the scale and nature of an undertaking and may be different for various kinds of effects caused by the undertaking".

Regulations under Section 106 (36 Code of Federal Regulations [CFR] 800.8(c)) allow the substitution of the NEPA reviews for the Section 106 process. Under this subsection, an agency can use the NEPA process and the documents it produces to comply with Section 106 in lieu of the procedures set forth in 36 CFR 800.3-800.6. In 2020, BOEM announced its intention to implement the NEPA substitution process for Section 106 review for renewable energy Construction and Operations Plans (COPs). Per the available guidance (Advisory Council on Historic Preservation [ACHP] and Council on Environmental Quality, 2013), the NEPA substitution process provides an opportunity for an agency to streamline its overall environmental and historic preservation review process.

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[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.

2.3 History of Archaeological Investigations

To support BOEM's efforts to identify historic properties within the Project's Preliminary Area of Potential Effects (PAPE), the Proponent conducted a Terrestrial Archaeological Resources Assessment (TARA) including archaeological reconnaissance surveys with an archaeological sensitivity assessment (Figure 2.3-1) and Phase I site identification archaeological testing for components of the proposed Project. The TARA included archival research, the development of Project-specific environmental and cultural contexts, a review of previous land use studies, a field review to evaluate the potential for undiscovered archaeological sites to be present within Project work areas, and Phase I site identification subsurface archaeological testing in archaeologically sensitive areas (Ritchie 2020; 2021a, 2021b, 2022; Ritchie 2023).

Phase 1

In 2020 an archaeological reconnaissance survey was conducted for the proposed Vineyard Wind OCS-A 0501 South Phase 1 Potential Export Cable Routes and Proposed Substation Project, currently referred to as the New England Wind Phase 1/Park City Wind Project, (the Project) in Barnstable, Massachusetts (Ritchie 2020). The reconnaissance survey evaluated potential onshore underground cable routes and substation sites being considered for the Phase 1 portion of 501 South. Project components included a transition zone between Nantucket Sound and land where horizontal directional drilling (HDD) will be used to install the cable at one of two landfall sites: Craigville Beach and Covell's Beach in Barnstable and Phase 1 potential onshore export cabling routes along existing roadways or utility rights-of-ways (ROWs). The proposed Phase 1 substation at 6-8 Shootflying Hill Road will connect to the existing West Barnstable Substation through a small parcel (Barnstable Assessor Parcel #214-001) adjacent to this existing substation.

The sensitivity of the Project (see Figure 2.3-1) for pre-contact Native American archaeological resources was defined primarily by its location in the coastal zone and a section of the interior terminal moraine and outwash plain zones with freshwater ponds and wetlands. Sensitivity for post-contact archaeological resources was defined by the Project's location within zones of seventeenth century to Modern Period Euro-American settlement in Barnstable. The Project's cable route also follows or intersects some of the roads forming primary local transportation routes such as Shootflying Hill, Great Marsh, Iyannough (Routes 132/28) and Old Stage roads, Main, South Main and Oak streets, and Phinney's Lane.

In 2021, an intensive archaeological survey was conducted at the proposed locations of four onshore components of the New England Wind Phase 1 Project (formerly called Vineyard Wind Connector 2 Project) (Ritchie 2022). The four components are a 6.7 and a 1.28-acre parcel for a substation site at 6 and 8 Shootflying Hill Road; a trenchless crossing entry bore and a 1,960 square foot (sq ft) temporary work zone for an onshore export cable crossing of the Centerville River within a 0.28-acre residential lot at 2 Short Beach Road; a trenchless exit pit and 300-ft long pipe laydown area north of the Centerville River in the shoulder of Craigville Beach Road; and a 2.8-acre parcel (Parcel 214-001) for a proposed horizontal directional drill crossing under Route 6. Site The trenchless exit pit and 300-ft long pipe laydown were within the recorded location of Site 19-BN-253, a pre-contact Native American shell midden documented by an avocational archaeologist. In June 2023, intensive archaeological survey was conducted at a tree clearing area off Service Road along the northern portion of the onshore cable route (Ritchie 2023).

Pre-contact Native American archaeological resources were found in the proposed substation parcel at 8 Shootflying Hill Road, at the proposed trenchless crossing entry bore and temporary work zone at 2 Short Beach Road, and at the proposed HDD entry/exit pit location in Parcel 214. The 8 Shootflying Hill Road Find Spot is an isolated chipped stone tool (utilized flake) and a piece of chipping debris. The 2 Short Beach Road Find Spot consists of 8 pieces of chipping debris found in modified soil contexts within a developed residential property next to the Centerville River. Testing in June 2023 resulted in the identification of the Service Road Find Spot consisting of 3 pieces of lithic chipping debris.

These cultural resources have limited information content, are not associated with broad patterns in the prehistory of southern New England, and additional investigations would be unlikely to yield significant new information. They do not possess the qualities required for listing in the National Register of Historic Places under Criterion A, B, C, and D (36 CFR 60.4). They are not related to any significant persons or events (Criterion A and B), they are not unique in form or function (Criteria C) and the undiagnostic cultural material would not yield additional information pertinent to the history of the region (Criteria D).

Construction monitoring is not recommended for any of the proposed Phase 1 facilities areas that have been subject to intensive archaeological testing.

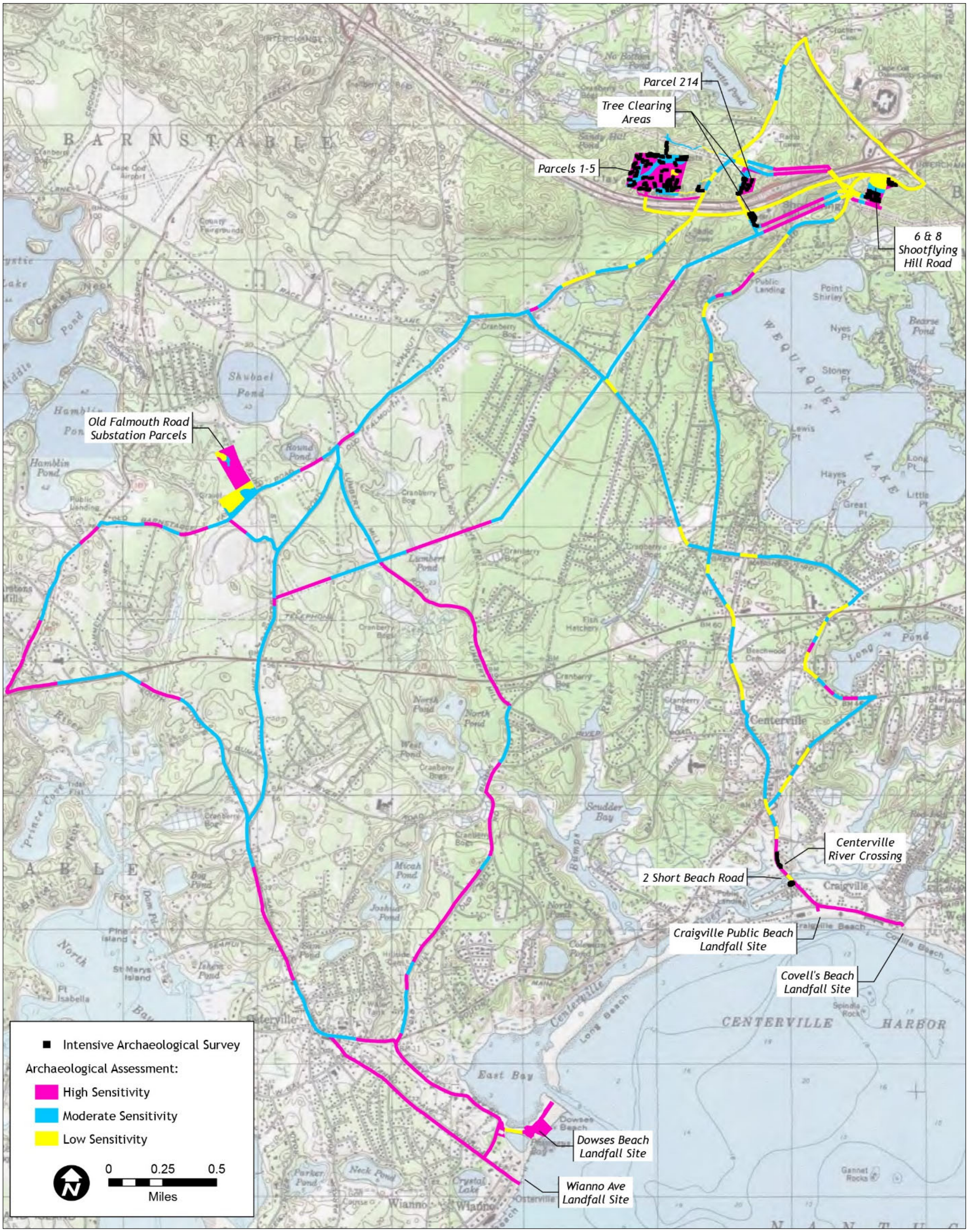

Figure 2.3-1. New England Wind Phase 1 and 2 Project proposed onshore substations, cable routes and HDD locations with areas of archaeological sensitivity.

Phase 2

In June 2020, a field 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, therefore the review was focused on a broad area in Barnstable. The 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 Tribal Nations regarding the potential for the New England Wind Project to affect both known and unrecorded cultural resources that may be present within the study area was recommended.

In September 2021, an archaeological reconnaissance survey that incorporated the 2020 field review and research was conducted for the Phase 2 Onshore Development Area, also known as the New England Wind 2 Connector. The reconnaissance survey included the landfall sites, onshore export cable routes and grid interconnection routes, and 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. The archaeological reconnaissance survey for the Phase 2 onshore development area identified zones of low, moderate, and high archaeological sensitivity (Ritchie 2021b) (see Figure 2.3-1).

In April and October of 2022 an intensive archaeological survey was conducted on three parcels of land proposed for a Phase 2 substation (Ritchie 2023). The survey resulted in the identification of one archaeological site (Clay Hill Site) and two find spots (Clay Hill find spots 1 and 2).

In May and June 2023 intensive archaeological survey was conducted for Phase 2 facilities including two additional parcels for the proposed Phase 2 substation location, an interconnection easement from that proposed substation site to an Eversource Right-of-Way, and access routes from Oak Street to the prosed substation. The testing resulted in the identification of a lithic projectile point fragment (Find Spot 1).

As with the cultural resources found on the proposed onshore Phase 1 facilities locations, the cultural resources found at proposed onshore Phase 2 facilities locations have limited information content, are not associated with broad patterns in the prehistory of southern New England, and additional investigations would be unlikely to yield significant new information. They do not possess the qualities required for listing in the National Register of Historic Places under Criterion A, B, C, and D (36 CFR 60.4). They are not related to any significant persons or events (Criterion A and B), they are not unique in form or function (Criteria C) and the undiagnostic cultural material would not yield additional information pertinent to the history of the region (Criteria D).

Construction monitoring is not recommended for any of the proposed onshore Phase 2 facilities areas that have been subject to intensive archaeological testing.

3.0 ARCHAEOLOGICAL MONITORING OF CONSTRUCTION

The Proponent acknowledges the sensitivity of the Project and is committed to protecting and preserving cultural resources, in accordance with federal and state legislation. The Proponent also recognizes that despite an archaeological reconnaissance survey and Phase I site identification archaeological testing, it is still possible that potentially significant archaeological resources, including human remains, could be discovered during onshore Project construction.

The following outlines the tasks and processes that will be followed as part of the onshore archaeological monitoring program for the New England Wind Phase 1 and 2 Project.

3.1 Consultation and Archaeological Permit Application

Archaeological and tribal monitoring by designated tribal monitors will be conducted in consultation with and under a permit issued by the Massachusetts State Archaeologist in the MHC, office of the Massachusetts State Historic Preservation Officer (SHPO). The Proponent will submit a new archaeological permit application to the MHC for the archaeological monitoring. The Proponent will submit the Archaeological Monitoring Plan, 30 days prior to implementation, to all consulting Tribal Nations with an interest in participating, specifically the Mashpee Wampanoag, the Wampanoag Tribe of Gay Head (Aquinnah), and the Mashantucket (Western) Pequot Tribal Nation for review. Any comments received from the Tribal Nations will be incorporated into the plan prior to implementation. Monitors will be supervised by an archaeologist that meets the Secretary of the Interior's *Professional Qualifications Standards for Archaeology and Historic Preservation* (36 CFR Appendix A to Part 61).

3.2 Contractor Training

The Proponent will inform the consulting Tribal Nations 30 days in advance of the contractor training schedule. Consulting Tribal Nations will participate in the contractor training if, within the 30-day window, they confirm it is necessary and that they are available to participate. The archaeological consultants and tribal representatives, if participating as described above, will prepare and give the Proponent and its contractor construction supervisors cultural and archaeological sensitivity training before the start of onshore construction so that the Proponent and their contractors are aware of the types of archaeological resources that may be encountered during construction. The purpose of this training will be to review state and federal regulations concerning archaeological resources and the general results of the archaeological investigations conducted within the onshore portions of the Project APE including types of artifacts and resources that may be present, provide an overview of the general and tribal cultural history of the area, and introduce contractors to the archaeological and tribal monitors. The procedures that will be followed if a significant cultural resource or archaeological deposit is discovered during construction will be reviewed during the training. Hard copies of this Archaeological Monitoring Plan will be printed and circulated to contractor supervisors at the contractor training for incorporation into construction documentation. Construction crews will be required to review the plan and have it with them during all construction activities.

3.3 Construction Monitoring

Construction monitoring by an archaeologist will be required in all areas designated as having high or moderate sensitivity except those that have been subject to intensive survey. The Proponent will inform the consulting Tribal Nations of the construction schedule, 30 days in advance of the start of construction, and allow them to monitor construction, at their discretion. The Tribes will be requested to notify the Proponent prior to the start of construction if a Tribal monitor will be available to monitor construction. Tribal monitors will coordinate directly with the New England Wind's Resident Engineer regarding construction schedules and will communicate any questions or concerns to the Resident Engineer.

Archaeological and tribal monitors will monitor excavation of each cable duct bank and HDD area that was determined to have moderate and high archaeological sensitivity, as shown on Figure 2.3-1, during the reconnaissance surveys of the Phase 1 and Phase 2 facilities but has not been subject to archaeological testing, Monitors will be present during all ground disturbing activities in those areas. If construction is occurring in more than one area, a monitor will be present in each area. The Resident Engineer will inform the archaeological monitor on a Friday every week if construction will be occurring in more than one area the following week.

Detailed maps with areas of sensitivity to be monitored during construction are shown for both Phase 1 and Phase 2 in Appendices D and E. Tribal monitors may request monitoring in areas that have not been designated as having moderate or high sensitivity, at their discretion. They should notify the Resident Engineer of that request who will respond to them within 24 hours. Archaeological and tribal monitors will document and record any archaeological features or other deposits (e.g. shell fragments, burned rock, chipping debris, pre-contact artifacts) visible in excavation trenches or at the drill sites. The following details the plan that the Proponent and their contractors will follow if archaeological and tribal monitors identify archaeological deposits during construction

Archaeological Discoveries

1. Possible archaeological remains may be discovered by archaeological and tribal monitors during construction. If suspected artifacts or archaeological features are exposed during construction, both archaeological and tribal monitors will stop work in the vicinity of the discovery until it can be determined if the materials are cultural and whether they represent a potentially significant site or archaeological deposit.

2. Archaeological monitors will immediately notify the Resident Engineer. Notification will include the activity, specific work area including location/address and construction site and provide digital photographs of the find.

3. The Resident Engineer will issue an official Stop Work Order and direct the contractor to secure the area by flagging or fencing off the area of the archaeological discovery. Any discovery made on a weekend or overnight hours will be protected until all consulting parties have been notified of the discovery.

4. Archaeological and tribal monitors will determine if the site is potentially significant and notify the all consulting parties. The Proponent, their contractors, and archaeologists will work with the MHC and Tribal Nations (as necessary) and in consultation with BOEM and BSEE, develop and implement a site treatment plan.

5. Since the area of any potential discovery will have been partially disturbed by construction, the objective of cultural resource investigation will be to evaluate data quickly so consultation can proceed as soon as possible. If archaeological investigations are required, the Resident Engineer will inform the construction supervisor that no construction work in the immediate vicinity of the discovery can proceed until archaeological fieldwork is complete. The area will be fenced off and be off-limits for work, but will not be identified as an archaeological site *per se* to protect the resource(s).

6. The duration of any work stoppage will be contingent upon the significance of the identified cultural resource(s) and consultation among the Proponent, BOEM and BSEE, MHC, Tribal Nations, and other consulting parties to determine treatment to avoid, minimize, or mitigate adverse effects to the identified site.

7. Once all consulting parties have agreed that the treatment measures are complete, the Resident Engineer will notify the contractor that construction work may proceed. The contractor will not resume work in the vicinity of the find until the Resident Engineer has granted clearance.

Human Remains Discoveries

If human remains are encountered during Project construction, they will be handled in accordance with the MHC's *KnowHow #4* (Appendix A) and guided by the policy statement adopted by the ACHPI on Historic Preservation (*Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects* (Appendix B).

Human remains will be treated with dignity and respect at all times. Skeletal remains and/or associated artifacts will be left in place and not disturbed. No remains or associated materials will be collected or removed until all notifications have been made, appropriate consultation has taken place, and a plan of action has been determined. The procedures that will be followed if human remains are unearthed during Project construction are:

1. If archaeological and/or tribal monitors identify human remains or possible human remains, all construction work in the vicinity of the find that could affect the integrity of the remains will cease.

The remains must not be touched, moved, or further disturbed. Archaeological and tribal monitors will document any such finds and notify the Resident Engineer immediately. No photographs or digital recording of human remains or associated funerary/ceremonial objects will be taken by construction contractors or construction personnel. Archeological and tribal monitors with the assistance of onsite contractors will take measures to ensure site security.

2. Archaeological monitors will record the location of the find, its time of discovery, and will immediately notify the Massachusetts State Police and regional Medical Examiner in accordance with Massachusetts general Laws. BOEM and BSEE will also be notified as soon as practicable.

3. If the Medical Examiner determines the remains are less than 100 years old, their treatment becomes the responsibility of the State Police. If the Medical Examiner determines the remains are more than 100 years old, the Medical Examiner will notify the Massachusetts State Archaeologist. The State Archaeologist, archaeological, and tribal monitors will determine if the remains are Native American and if they are the Massachusetts Commission on Indian Affairs (MCIA) is also notified.

4. The Proponent, BOEM, BSEE, the State Archaeologist, and if the remains are Native American, the the MCIA and consulting Tribal Nations will discuss whether there are prudent and feasible alternatives to protect the remains. The results of this consultation will be made in writing. If it is not possible to protect the remains, they may be excavated only under a Special Permit issued by the MHC after the review of a recovery plan that specifies a qualified research team, research design, and plan for the disposition of the remains consistent with the results of consultation 950 CMR 70.20(2).

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 BSEE 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, transport, and storage of any remains to ensure their security and respectful treatment.

3.4 Laboratory Processing and Analyses

Any archaeological materials collected during monitoring activities will be processed. Processing activities include cleaning, identification, and cataloging of any recovered cultural materials; the preliminary analysis of spatial distributions of cultural materials; and artifact photography of diagnostic or representative artifact types. All materials will be returned to The Public Archaeology Laboratory Inc.'s (PAL) facilities for processing, cataloging, and curation, until a permanent repository is designated. The PAL facility is an approved curation facility for the Commonwealth of Massachusetts. All laboratory activities will be supervised by the PAL Laboratory Manager who meets the Secretary of the Interior's *Professional Qualifications Standards for Archaeology and Historic Preservation* (36 CF Appendix A to Part 61).

At a minimum the collected cultural materials will be stored in acid-free Hollinger boxes with box content lists and labels printed on acid-free paper. These boxes will be curated in accordance with the curation plan developed through consultation with the Tribal Nations, agencies, and other consulting parties per Stipulation X.B.1 of the Memorandum of Agreement for the Project.

4.0 DOCUMENTATION AND REPORTING

Archaeological monitors will prepare daily logs that summarize the results of monitoring activities for submission to the Proponent. Recorded data will include the date, archaeological and tribal monitors, work location and activity, observations and finds, and any other relevant comments. A weekly report will be compiled (which will include a weekly summary of activities and a look-ahead schedule) and forwarded electronically by email to all consulting parties, if requested.

On completion of the onshore construction monitoring, archaeological monitors will prepare an archaeological monitoring report that describes the methodology and results of the construction monitoring, discusses any archaeological deposits that were encountered during construction, and offers recommendations regarding the significance of any identified deposits and the need for additional work and consultation. Draft copies of the report will be submitted to the Proponent for review and then to BOEM and BSEE, the MHC, and the Tribal Nations within 60 days of completion of onshore construction. Any comments received within 30 days will be addressed in the final report to be submitted 60 days after the submission of the draft report. If necessary, archaeological site forms will be completed and submitted to the MHC. The report produced will meet the standards outlined in the Secretary of Interior's *Standards and Guidelines for Archeology and Historic Preservation* (48 FR 44716 1983), the procedures outlined in MHC’s *Public Planning and Environmental Review: Archeology and Historic Preservation* and 950 CMR 70.14.

5.0 REFERENCES

Advisory Council on Historic Preservation

2023 *Policy Statement on Burial Sites, Human Remains, and Funerary Objects*. Washington, D.C.

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The Public Archaeology Laboratory, Inc.

2023 *Procedures Guiding the Discovery of Unanticipated Archaeological Resources and Human Remains.*

Ritchie, Duncan

2020 *Archaeological Reconnaissance Survey, Vineyard Wind 501 South Phase 1 Onshore Development Area Potential Export Cable Routes and Proposed Substation Project Barnstable, Massachusetts.* The Public Archaeology Laboratory, Inc. Report 3784. Submitted to Epsilon Associates, Inc. Maynard, MA.

2021a *Vineyard Wind South Phase 1 (Park City Wind)/Vineyard Wind Connector 2 Results of Archaeological Monitoring Craigville Beach Landfall Site Onshore Export Cable Route Substation (8 Shootflying Hill Road) Vineyard Wind South Phase I (Connector 2) Onshore Cabling Project*, *Barnstable, Massachusetts.* The Public Archaeology Laboratory, Inc. Report 3784.01. Submitted to Epsilon Associates, Inc. Maynard, MA.

2021b *Archaeological Reconnaissance Survey Vineyard Wind South Phase 2 Potential Onshore Export Cable Route Project, Barnstable, Massachusetts*. PAL Report No. 3784.01. Submitted to Epsilon Associates, Inc. Maynard, MA.

2022 *Intensive Archaeological Survey New England Wind Phase 1 (Park City Wind)/New England Wind 1 Connector Onshore Project Components, Barnstable, Massachusetts*. PAL Report No. 3784.01. Submitted to Epsilon Associates, Inc., Maynard, MA and Park City Wind LLC.

2023 *2023 Intensive Archaeological Surveys for New England Wind Phase 1 and 2 Facilities, Barnstable, Massachusetts*. PAL Report 3784.01 (D). Submitted to Epsilon Associates, Inc., Maynard, MA and Park City Wind LLC.

APPLICABLE REGULATIONS AND GUIDELINES

Federal

- National Historic Preservation Act of 1966, as amended (54 USC 306108), Sections 106 and 110, and implementing regulations at 36 CFR 800
- National Environmental Policy Act of 1970
- Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* (48 CFR 44716-42)
- Advisory Council on Historic Preservation: *Policy Statement on Burial Sites, Human Remains, and Funerary Objects* 2023 (Appendix B)
- Advisory Council on Historic Preservations *Policy Statement on Burial Sites, Human Remains, and Funerary Objects: Explanation and Discussion 2023.*
- Advisory Council on Historic Preservation: *Recommended Approach for consultation on Recovery of Significant Information from Archaeological Sites* (64 FR 27085-27087)

Massachusetts

- Massachusetts General Laws Chapter 9 Sections 26A through 27C, as amended, and regulations at 950 CMR 70 and 71.
- 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 Historical Commission: *KnowHow #4 What to do when Human Burials are Uncovered* (no date) (Appendix A)
- Massachusetts Historical Commission: *Policy for Disposition of Non-Native Human Remains Which Are Over 100 Years Old or Older* (1990) (Appendix C)

LIST OF CONTACTS

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APPENDIX A

MASSACHUSETTS HISTORICAL COMMISSION KNOWHOW #4

KnowHow #4

INFORMATION AND ASSISTANCE FROM THE MASSACHUSETTS HISTORICAL COMMISSION

What to Do When Human Burials are Accidentally Uncovered

1. Why are bones sometimes found?

In Massachusetts, many unmarked graves exist without gravestones, fences, tombstones, or other surface indications of their presence. These are chiefly the graves of prehistoric and historic Indians, which may never have been marked at all; and graves which had been identified at one time in the past, but the markings are no longer visible. As a result, bones are often found during ordinary ground disturbance activities such as the construction of new homes, utilities, or roads; in the agricultural or industrial use of a site; or the excavation of sand or gravel borrow. Bones are also sometimes found eroding out of areas exposed by natural erosion, floodwater scouring, or sand dune formation.

A new law has been enacted which establishes procedures to follow when human bones are accidentally discovered.

2. Who is involved?

Private citizens, State and Local Police, Medical Examiners, State Archaeologist, and the Commission on Indian Affairs.

3. What should you do if you discover bones?

Do not touch or disturb the bones. Notify the state or local police and the regional medical examiner about the discovery and location.

4. What does the Medical Examiner do?

The Medical Examiner investigates the discovery to determine whether the bones are human, and whether they are recent or more than 100 years old. If the bones are less than 100 years old, a criminal investigation may be warranted. If the bones are more than 100 years old, the Medical Examiner then notifies the State Archaeologist, who immediately conducts an archaeological investigation of the site. Throughout these investigations, the police authorities must insure that the site is protected from further damage.

5. What does the State Archaeologist do?

The State Archaeologist investigates the site to determine the age, cultural association and identity of the burial. If the State Archaeologist determines that the burial is that of a Native American, the Commission on Indian Affairs is notified. The State Archaeologist consults with the landowner to determine whether the burial can remain undisturbed. In the case of development projects, the owner and State Archaeologist discuss whether there are prudent and feasible steps the owner can take to protect the burial. If it is impossible to avoid future harm to the burial, the State Archaeologist removes the remains.

6. What does the Commission on Indian Affairs do?

The archaeological investigation of Indian burials is monitored by the Commission on Indian Affairs to insure that the remains are treated respectfully.

> Please remember: Once bones or artifacts are removed from the site, valuable information concerning the identity and age of the human remains is lost. Therefore, it is important not to disturb the site in any way until the State Archaeologist can conduct an investigation and record the discovery.

BIBLIOGRAPHY

Massachusetts General Laws, Chapter 38, section 6; Chapter 9, sections 26A & 27C; Chapter 7, section 38A; Chapter 114, section 17; as amended by Chapter 659 of the Acts of 1983 and Chapter 386 of the Acts of 1989.

For Further Information:

Please contact the State Archaeologist at the Massachusetts Historical Commission.

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APPENDIX B

ACHP POLICY STATEMENT REGARDING TREATMENT OF BURIAL SITES, HUMAN REMAINS AND FUNERARY OBJECTS

ADVISORY COUNCIL ON HISTORIC PRESERVATION
POLICY STATEMENT ON BURIAL SITES, HUMAN REMAINS, AND FUNERARY OBJECTS

March 1, 2023

Preamble. The Advisory Council on Historic Preservation (ACHP) developed this policy statement to establish a set of principles and rules that the ACHP will encourage federal agencies to adopt as they carry out their day-to-day responsibilities under Section 106 of the National Historic Preservation Act (NHPA). This statement also establishes a set of standards and guidelines that federal and state agencies, local entities, Indian Tribes, industry applicants, and other relevant entities should, at a minimum, seek to implement in order to provide burial sites, human remains, and funerary objects the consideration and protection they deserve.

This policy statement is not bound by geography, ethnicity, political or socioeconomic status, or a system of belief and recognizes that the respectful consideration for burial sites, human remains, and funerary objects is a human rights concern shared by all. However, the burial sites, human remains, and funerary objects of certain groups of people, including but not limited to Indian Tribes, Native Hawaiians, enslaved Africans and their descendants, and other Indigenous Peoples, have a higher probability of being unmarked and undocumented and thus more likely to be affected by development projects. As such, this policy statement emphasizes the need for consultation and coordination with those communities, including seeking consensus in decision making and providing deference to their practices, protocols, and preferences, where feasible.

Section 106 requires agencies to consult and seek agreement with consulting parties on measures to avoid, minimize, or mitigate adverse effects to historic properties. Accordingly, and consistent with Section 106, this policy does not recommend a specific outcome from the consultation process. Rather, it focuses on issues and perspectives that federal agencies should consider while carrying out their consultation and decision-making responsibilities. The ACHP will incorporate these principles in its work and encourages federal agencies and other entities to apply the principles in this policy any time there is potential to encounter burial sites, human remains, or funerary objects.

In many cases, burial sites, human remains, and funerary objects are subject to other applicable federal, Tribal, state, or local laws or protocols that may prescribe a specific outcome, such as the Native American Graves Protection and Repatriation Act (NAGPRA). In those scenarios, the federal agency should identify and follow all applicable laws or protocols and implement any prescribed outcomes. NHPA and NAGPRA are separate and distinct laws, with separate and distinct implementing regulations and categories of parties that must be consulted.[1] Compliance with one of these laws does not equate to or fulfill the compliance requirements of the other. Implementation of this policy and its principles does not, in any way, change, modify, or detract from NAGPRA or other applicable laws.

Authority: The authority for this policy stems from the ACHP's statutory responsibility to advise on matters relating to historic preservation (which includes the role of Indian Tribes, Tribal Historic

[1] The ACHP's publication Consultation with Indian Tribes in the Section 106 Process: The Handbook (2021) and the National Association of Tribal Historic Preservation Officers' publication Tribal Consultation: Best Practices in Historic Preservation (2005) provide additional guidance.

ADVISORY COUNCIL ON HISTORIC PRESERVATION

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Preservation Officers [THPOs], and Native Hawaiian organizations [NHOs] in that process), to advise the President and Congress regarding historic preservation matters, and to recommend methods to federal agencies to improve the effectiveness, coordination, and consistency of their historic preservation policies. While the ACHP recognizes that not all burial sites, human remains, and funerary objects may constitute or be associated with historic properties eligible for or listed in the National Register of Historic Places, the consideration and treatment of such places fall within the concerns of the historic preservation community.[2]

This policy statement recognizes the unique legal and political relationship between the federal government and federally recognized Indian Tribes as set forth in the Constitution of the United States, treaties, statutes, and court decisions, and acknowledges that the federal Indian trust responsibility is a legal obligation under which the United States "has charged itself with moral obligations of the highest responsibility and trust" toward Indian Tribes.[3] Part of the ACHP's trust responsibility is to ensure that the regulations implementing Section 106 incorporate the procedural requirement that federal agencies consult with Indian Tribes and NHOs that attach religious and cultural significance to historic properties that may be affected by undertakings the federal agency proposes to carry out, license, permit, or assist.[4] In general, the trust responsibility establishes fiduciary obligations on the part of federal agencies to Tribes, including a duty to protect Tribal lands and cultural and natural resources for the benefit of Tribes and individual Tribal members.

The ACHP views its trust responsibility as encompassing all aspects of historic resources including intangible values.[5] As part of that trust responsibility, the ACHP offers this policy statement to inform how the Section 106 consultation process should consider burial sites, human remains, and funerary objects.

Principles. The care for and consideration of burial sites, human remains, and funerary objects is of significant social and moral consequence in the United States and U.S. territories. When burial sites, human remains, or funerary objects are or have the potential to be encountered during the planning or implementation of a proposed federal undertaking, the following principles should be adhered to:

> **Principle 1**: Burial sites, human remains, and funerary objects should be treated with dignity and respect in all circumstances regardless of National Register eligibility or the circumstances of the action (i.e., exemptions, disaster, and emergencies). This includes, but is not limited to, all times prior to and during consultation, during field surveys, when handling must occur, in documenting and/or reporting, if treatment actions occur, and in all other forms of interaction.
>
> **Principle 2**: Disturbing or disinterring burial sites, human remains, or funerary objects, when not requested by descendants, associated Indian Tribes or NHOs, or required by applicable law or regulation, should not be pursued unless there are no other alternatives available and only after consultation with descendants or other legally associated individuals or groups and fully considered avoidance of impact and preservation in place.
>
> **Principle 3**: Only through consultation, which includes the early and meaningful exchange of information and a concerted effort to reach consensus, can informed decisions be made about the identification, documentation, National Register eligibility, and treatment of burial sites, human remains, and funerary objects.

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[2] 54 U.S.C. §§ 304102 and 304108

[3] *Seminole Nation v. United States*, 316 U.S. 286 (1942)

[4] "The Advisory Council on Historic Preservation's Statement on Its Trust Responsibility" (Advisory Council on Historic Preservation, 2004)

[5] "Policy Statement Regarding the Council's Relationship with Indian Tribes" (Advisory Council on Historic Preservation, 2000)

Principle 4: To the maximum extent possible, decision making should give deference to the treatment requests of descendants or other legally associated individuals or groups. Where known, and in accordance with applicable law, cultural practices of the descendants or associated groups should be followed if burial sites, human remains, or funerary objects may be encountered, are inadvertently identified, impacted, or must be disinterred.

Principle 5: The Indigenous Knowledge held by an Indian Tribe, NHO, or other Indigenous Peoples is a valid and self-supporting source of information. To the fullest extent possible, deference should be provided to the Indigenous Knowledge and expertise of Indian Tribes, NHOs, and Indigenous Peoples in the identification, documentation, evaluation, assessment, and treatment of their burial sites, human remains, and funerary objects.

Principle 6: Burial sites, human remains, and funerary objects are important in and of their own right. They may also constitute or be part of a sacred site and may include or incorporate several possible elements of historic significance including religious and cultural significance. The integrity of burial sites, human remains, and funerary objects is best informed by those who ascribe significance to them.

Principle 7: Burial sites, human remains, and funerary objects are frequently associated with cultural practices, sacred sites, Indigenous Knowledge, and other forms of culturally sensitive actions and/or information unique to a people. Maximum effort should be taken to limit the disclosure of confidential or sensitive information through all available mechanisms including, but not limited to, the proper handling and labeling of records, limiting documentation to necessary information, and through the application of existing law.

Principle 8: The federal Indian boarding school system directly targeted American Indian, Alaska Native, and Native Hawaiian children in the pursuit of a policy of cultural assimilation that coincided with territorial dispossession. In partnership with the historic preservation community, federal agencies should seek to implement the recommendations identified in the Department of the Interior's Federal Indian Boarding School Investigative Report by supporting community-driven identification, documentation, interpretation, protection, preservation, reclamation, and co-management of burial sites, human remains, and funerary objects across that system, including marked and unmarked burial areas, and supporting repatriation where appropriate.

Principle 9: The legacies of colonization, including cultural assimilation, forced relocation, and slavery, have led to an uneven awareness of where and why practitioners are likely to encounter burial sites, human remains, and funerary objects across the United States and its territories. The historic preservation community has a key role in expanding public education to support greater awareness of and consideration for the histories and lifeways of Indian Tribes, Native Hawaiians, African Americans, and Indigenous Peoples including recognizing and respecting the historical trauma that these groups and individuals may experience.

Principle 10: Access to and/or repatriation of burial sites, human remains, and funerary objects should be enabled through fair, transparent, and effective mechanisms developed in conjunction with descendant communities to the fullest extent of the law.

Principle 11: Human remains and funerary objects may be relocated or removed from a location by or at the request of descendent communities for a variety of reasons. The continued presence of human remains or funerary objects may not be essential to the ongoing significance and integrity of a site or its relevance to a broad theme in history. The historic significance and integrity of such sites are best determined in consultation with lineal descendants and/or associated communities.

Principle 12: Climate change can impact the burial sites, sacred sites, cemeteries, and associated cultural practices significant to Indian Tribes, NHOs, and other groups of people. Climate plans should be developed in consultation and should include mechanisms to support the advanced identification and protection or treatment of these locations.

Principle 13: Respectful consideration of burial sites, human remains or funerary objects may require additional assistance from consulting parties to properly identify, document, evaluate for National Register eligibility, and/or conduct treatment actions. If a federal agency requests or relies on an Indian Tribe, NHO, or other party to carry out activities that are the federal agency's responsibility under the NHPA, the Indian Tribe, NHO, or other consulting party should be reimbursed or compensated.[6]

Implementation of the Policy. Implementation of this policy statement is the responsibility of the ACHP's leadership and staff; however, the ACHP recognizes that appropriate expertise and experience to ensure effective implementation may also reside in other parties. Accordingly, the ACHP commits to advancing consideration of burial sites, human remains, and funerary objects in the Section 106 process with its preservation partners through the following:

A. Train ACHP staff regarding the implementation of this policy statement.

B. Development of informational resources that address the NHPA, Section 106, and the following:
   i. The Federal Indian Boarding School Initiative
   ii. The intersection of NAGPRA
   iii. Acquiring and managing sensitive information
   iv. Climate change and burial sites, human remains, and funerary objects
   v. Best practices in the treatment of marked and unmarked burial sites, human remains, and funerary objects.

C. ACHP staff will seek opportunities to implement the policy principles into Section 106 agreement documents and program alternatives to advance consideration of burial sites, human remains, and funerary objects.

D. The ACHP will advise federal agencies, Indian Tribes, Tribal and State Historic Preservation Officers, and NHOs in their development of historic preservation protocols for appropriate consideration of burial sites, human remains, and funerary objects.

E. Encourage federal agencies and other relevant parties to give full and meaningful consideration to burial sites, human remains, and funerary objects consistent with this policy statement.

Policy Review Period. The ACHP commits to reviewing this policy statement approximately every five years from the date of its adoption to ensure its continued applicability. The ACHP executive director will seek input regarding the need to update this policy statement through appropriate ACHP committees, including Federal Agency Programs and Native American Affairs. Amendments shall be pursued when the executive director or ACHP members determine that such action is required and/or would significantly improve the policy statement. This policy statement shall be in effect until rescinded by ACHP members.

Definitions. The definitions provided below are meant to inform the application of this policy statement. However, terms such as burial site, intact, disturbance, and human remains, among others, often require the input of associated parties to more fully understand how to interpret or apply each term. The

[6] Consistent with ACHP's Guidance on Assistance to Consulting Parties in the Section 106 Review Process, when the federal agency (or in some cases the applicant) seeks the views and advice of any consulting party in fulfilling its legal obligation to consult with them, the agency or applicant is not required to pay that party for providing its views.

definitions provided below are intended to be inclusive and to advance the preservation and protection of burial sites, human remains, and funerary items, as appropriate.

- **Burial Site**: Any location, whether originally below, on, or above the surface of the earth, where human remains are or have been located.
- **Confidential**: Information that is protected by law, regulation, or federal policy. Preserving authorized restrictions on information access and disclosure, including means for protecting personal privacy and proprietary information
- **Consultation**: The process of seeking, discussing, and considering the views of other participants and, where feasible, seeking agreement with them. A foundational activity in the Section 106 review process.
- **Consulting parties**: Persons or groups the federal agency consults with during the Section 106 process. They may include the State Historic Preservation Officer; Tribal Historic Preservation Officer; Indian Tribes and Native Hawaiian organizations; representatives of local governments; applicants for federal assistance, permits, licenses, and other approvals; and/or any additional consulting parties.[7] Additional consulting parties may include individuals and organizations with a demonstrated interest in the undertaking due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking's effects on historic properties.[8]
- **Culturally sensitive**: Tangible and intangible property and knowledge which pertains to the distinct values, beliefs, and ways of living for a culture. It often includes property and knowledge that is not intended to be shared outside the community of origin or outside of specific groups within a community.[9]
- **Disturbance**: Disturbance of burial sites that are listed in or eligible for listing in the National Register of Historic Places likely would constitute an adverse effect under Section 106. An adverse effect occurs when "an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, setting, materials, workmanship, feeling, or association".[10] Determination of what constitutes a "disturbance" should be defined in consultation with proper deference provided to the views and opinions of descendant individuals and/or communities.
- **Funerary objects**: Objects that, as part of the death rite or ceremony of a culture, are reasonably believed to be associated with human remains.
- **Historic property**: Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. It includes artifacts, records, and remains that are related to and located within such properties, and it includes properties of traditional religious and cultural importance to an Indian Tribe or Native Hawaiian organization and that meet the National Register of Historic Places criteria.[11]
-**Human remains**: The physical remains of a human body including cremains, fragmented human remains, hair, and fluid, among other components. When human remains are believed to be comingled with other material (such as soil or faunal), the entire admixture should be treated as human remains.
- **Indian Tribe**: An Indian Tribe, band, nation, or other organized group or community, including a Native village, Regional Corporation or Village Corporation, as those terms are defined in Section 3 of the Alaska Native Claims Settlement Act[12], which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians.[13]
- **Indigenous Knowledge (IK)**: Information provided by an Indian Tribe, Tribal member, Native Hawaiian, or other Indigenous person uniquely reflective of their knowledge, experience, understanding, or observation relating to cultural resources, practices, or actions. Indigenous Knowledge often constitutes sensitive information.

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[7] Based on 36 CFR § 800.2(c)
[8] 36 CFR § 800.2(c)(6)
[9] "Native American Archival Materials," (First Archivist Circle, 2007)
[10] 36 CFR § 800.5(a)(1)
[11] 36 CFR § 800.16(1)
[12] 43 U.S.C. § 1602
[13] 36 CFR § 800.16(m)

- **Native Hawaiian**: Any individual who is a descendant of the aboriginal people who, prior to 1778, occupied and exercised sovereignty in the area that now constitutes the state of Hawaii.[14]
- **Native Hawaiian organization (NHO)**: Any organization which serves and represents the interests of Native Hawaiians; has as a primary and stated purpose the provision of services to Native Hawaiians; and has demonstrated expertise in aspects of historic preservation that are significant to Native Hawaiians.[15]
- **Preservation in place**: Taking active steps to avoid disturbing a burial site, human remains, or funerary objects including, to the maximum extent practical, any access, viewsheds, setting, and/or ongoing cultural activity that may be associated with the location.
- **Section 106**: That part of the NHPA which establishes a federal responsibility to take into account the effects of undertakings on historic properties and to provide the ACHP a reasonable opportunity to comment with regard to such action.
- **Sensitive**: Information that may be protected by law, regulation, or federal policy; information that may be identified as sensitive by the sponsoring entity/original source.
- **State Historic Preservation Officer (SHPO)**: The official appointed to administer a state's historic preservation program.[16]
- **Tribal Historic Preservation Officer (THPO)**: The official appointed or designated to administer the Tribe's historic preservation program.[17]
- **Treatment**: Measures developed and implemented to avoid, minimize, or mitigate adverse effects to historic properties.

[14] 36 CFR § 800.16(s)(2)
[15] 36 CFR § 800.16(s)(1)
[16] 54 U.S.C. § 302301
[17] 54 U.S.C. § 302702

APPENDIX C

MHC POLICY FOR DISPOSITION OF NON-NATIVE HUMAN REMAINS

The Commonwealth of Massachusetts
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

POLICY AND GUIDELINES FOR THE DISPOSITION OF NON-NATIVE HUMAN REMAINS WHICH ARE ONE HUNDRED YEARS OLD OR OLDER

INTRODUCTION

The unmarked burial law requires individuals and entities who discover an unmarked human burial or skeletal remains to cease any activity upon the site which would deface, alter, destroy or otherwise impair the integrity of the site until the State Archaeologist has conducted a site evaluation. G.L. c. 9, ss. 27C (1988 ed.). If the State Archaeologist determines that the remains are American Indian, the final disposition of the remains, after any skeletal analysis, may be reinterred at the discretion of the Commission on Indian Affairs. G.L. c.7, ss. 38(A) (1988 ed.). However, if the remains are non-native and are suspected of being one hundred years old or more, the previous section of the law required that such remains be deposited within a curatorial facility. G.L. c. 26A., ss. (7) (1988 ed.). This section of the law has been amended to provide reinterment as an option for non-native human remains. Specifically, Chapter 386 of the Acts of 1989 altered clause seven (7) of the first paragraph of section 26A of chapter 9 of the General laws by striking the sentence which mandates depositing such remains within a curatorial facility and inserting the following:

> The state archaeologist shall determine whether a skeletal analysis of the remains shall be conducted. If he determines that such analysis shall be made after the completion of the said analysis, the state archaeologist shall determine whether the remains shall be deposited in a curatorial facility or reinterred in accordance with the provisions of section forty-three M of chapter one hundred and fourteen. It shall be the responsibility of the person, whose proposed action necessitates the removal of skeletal remains, to conduct and bear the financial costs of said skeletal analysis and reinterment.

Application of this section necessitates the State Archaeologist to make the decision whether such remains will be deposited in a curatorial facility or reinterred. In order to properly take into account all factors for purposes of making such a decision, the Massachusetts Historical Commission hereby implements the following policy:

POLICY

Definitions

With respect to this policy, the following terms are defined:

Remains shall mean the skeletal remains of human non-natives.

Non-Native means those who are not of American Indian descent.

Reinterment means the reentry of remains into the ground, a tomb or other enclosure for purposes of reburial.

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Interested Parties shall include, but not be limited to, those of direct kinship to the deceased, those possessing a cultural, tribal, or religious affiliation, those whose interest stems from a cultural, tribal, or religious affiliation, those whose interest stems from a scientific, environmental, or educational purpose, the owner of the land upon which the burial site is located, and local or state governmental agencies.

Statement of Policy

1. Remains shall be deposited in a curatorial facility unless an interested party files a statement with the State Archaeologist, pursuant to the outlined procedure, requesting that such remains be reinterred.

2. When a request for reinterment is received, the State Archaeologist shall consider all interested parties' views for purposes of issuing a decision as to whether the remains should be curated or reinterred.

3. Where the scientific research value of non-native human remains outweighs any objections that descendants may have to their study such remains will be retained in perpetuity for study in a curatorial facility and will not be reinterred.

4. If it is decided that the remains will be reinterred, the reinterment process should approximate the wishes of the deceased. For purposes of determining the intent of the deceased with respect to the type of reburial, archaeological and historical factors should be evaluated, as well as the methods employed in the original burial.

5. With respect to the reinterment process, the State Archaeologist shall maintain complete records of the archaeological investigation and analysis, the original burial site, and the final burial site.

6. The site chosen for reinterment should be protected from any disturbance to the land as a permanent burial ground or cemetery or by a deed restriction or easement which runs in perpetuity.

7. If it is decided that the remains should be reinterred, the proponent of the project whose action necessitated the removal of such remains shall bear the expense of reinterment.

Procedure

1. *Request for Reinterment:* Interested parties may file a request for reinterment of remains with the State Archaeologist. Such request should be addressed to:

> State Archaeologist
> Massachusetts Historical Commission
> 220 Morrissey Boulevard
> Boston, MA 02125

Such request should include:

A. Statement explaining how you qualify as an interested party with respect to the disposition of such remains.

B. Reasoning as to why such remains should be reinterred.

C. Specification with respect to the preferred reinterment site and reburial procedures.

2. *Statements Favoring Curation Over Reinterment:* Once a request for reinterment is filed, the State Archaeologist will consider any statements from interested parties which favor curation of such remains, as opposed to reinterment. Such statements should contain:

A. Statement explaining how you qualify as an interested party with respect to the disposition of such remains.

B. Reasoning as to why such remains should be curated.

C. Specification as to which curatorial facility the remains should be deposited.

3. *State Archaeologist's Decision to Reinter or Curate:* In response to a request for interment, the State Archaeologist shall consider the following factors in rendering a decision with respect to either curation or reinterment of the remains:

A. Scientific and research value of such remains.

B. The completeness and adequacy of the analysis of the remains.

C. The public interest.

D. If reinterment, the appropriateness of the proposed burial site and procedures.

The State Archaeologist shall issue a written finding to all participating interested parties within sixty (60) days of receipt of a request for reinterment.

4. *Appeal Process:* Any interested party make appeal the decision of the State Archaeologist to the full Massachusetts Historical Commission by filing an appeal within thirty (30) days of the State Archaeologist's finding. Appeals should be addressed to:

Executive Director
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

Such appeal will be discussed at the next meeting of the Massachusetts Historical Commission (Commission). The petitioner will be notified of the time and place of such meeting so that he or she has the opportunity to present arguments.

Once an appeal is filed, no action will be taken by the State Archaeologist with respect to the disposition of the remains until the Commission has rendered a decision on the appeal.

The Commission shall make its decision on the appeal within ninety (90) days of the Commission meeting.

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APPENDIX D

NEW ENGLAND WIND PHASE 1 ARCHAEOLOGICAL SENSITIVITY MAPS

New England Wind Phase 1
(Park City Wind)/New England Wind Connector 1
Barnstable, Massachusetts

PAL: due diligence / assessment	5-22-2020
Epsilon: routes and parcels	4-20-2020
Basemap: USGS via ArcGIS Online	various

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THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

KEY:

Existing West Barnstable Substation

Archaeological Assessment:

- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

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Feet

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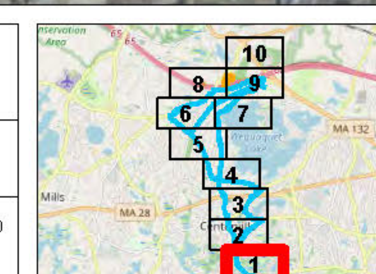

Appendix D-1. New England Wind Phase 1 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

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Last saved: 7/31/2023

New England Wind Phase 1
(Park City Wind)/New England Wind Connector 1
Barnstable, Massachusetts

PAL: due diligence / assessment	5-22-2020
Epsilon: routes and parcels	4-20-2020
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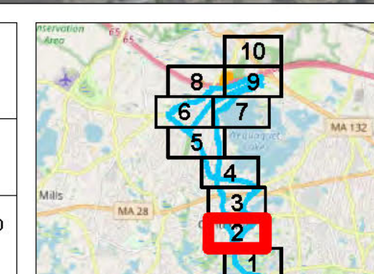

Appendix D-2. New England Wind Phase 1 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

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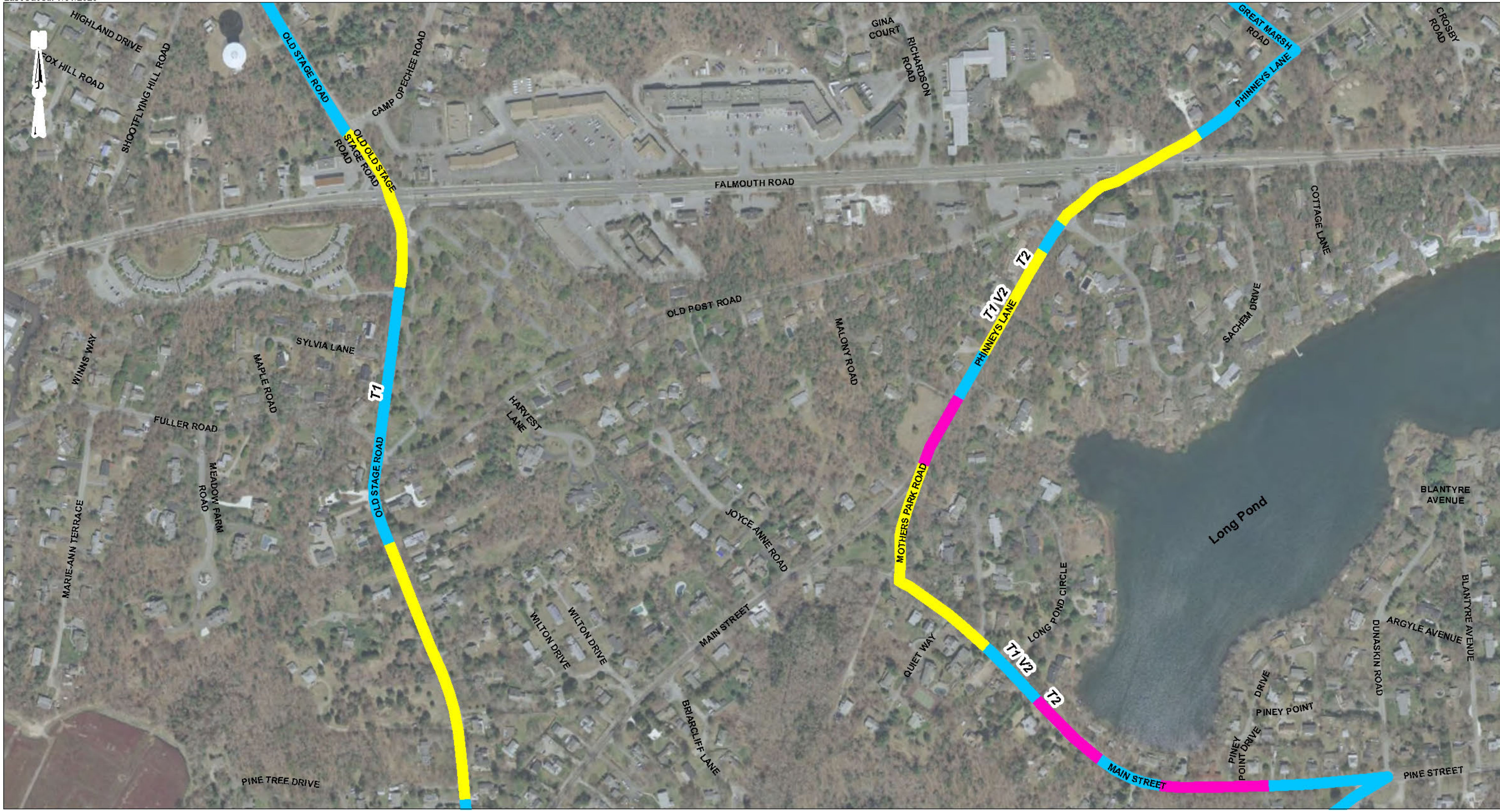

PAL: due diligence / assessment	5-22-2020
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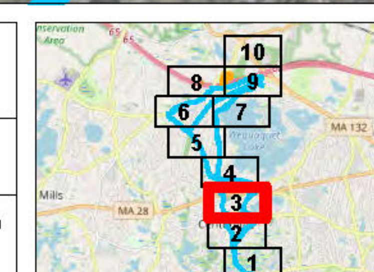

Appendix D-3. New England Wind Phase 1 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

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PAL: due diligence / assessment | 5-22-2020
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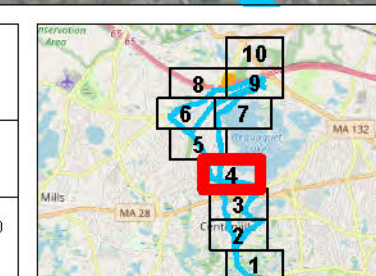

Appendix D-4. New England Wind Phase 1 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

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Basemap: USGS via ArcGIS Online	various

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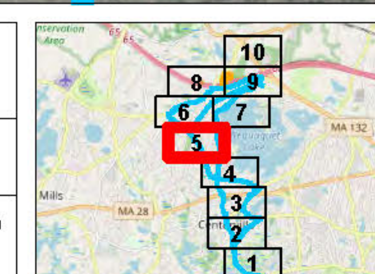

Appendix D-5. New England Wind Phase 1 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

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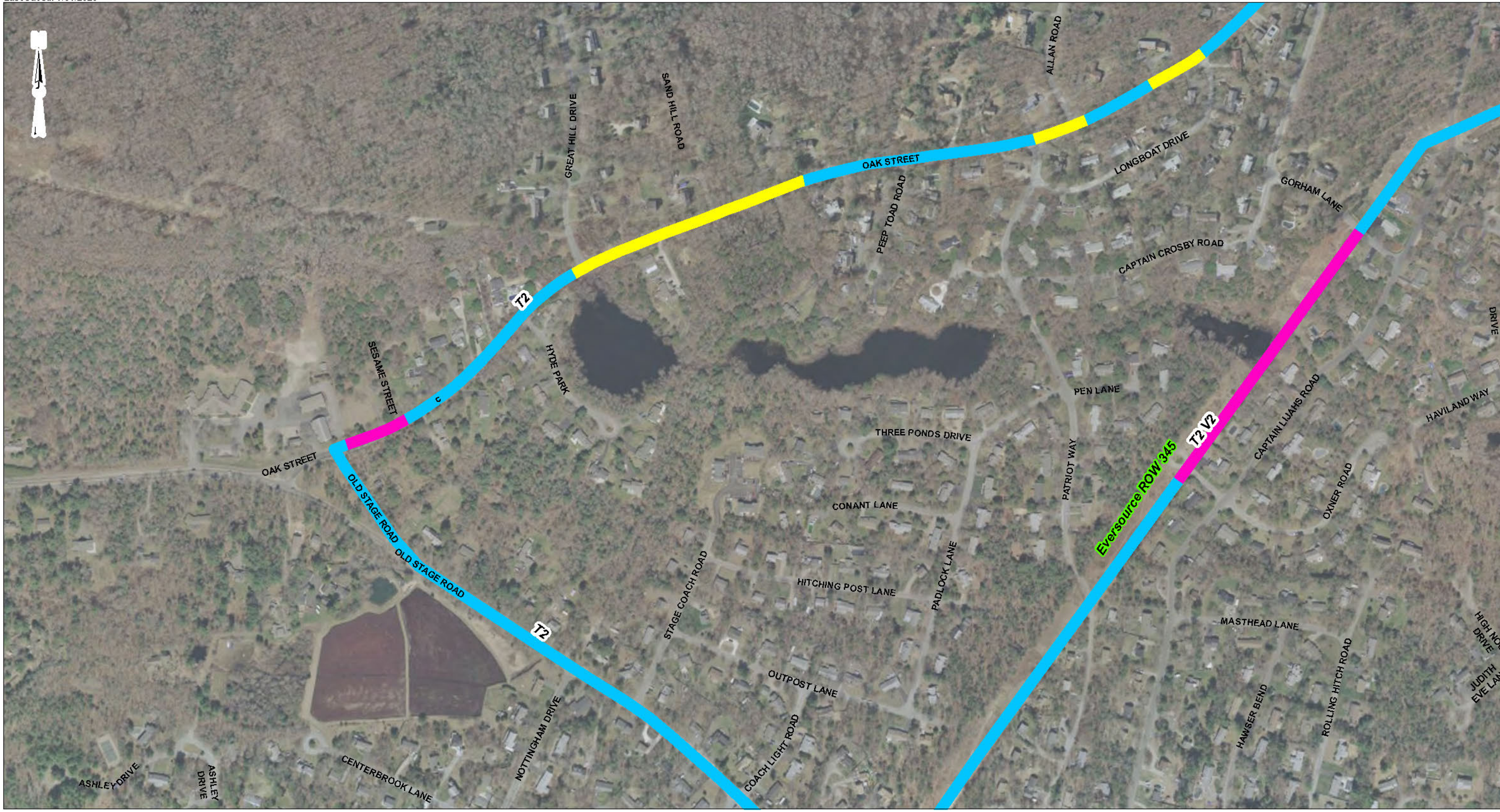

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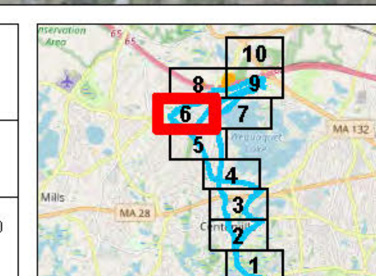
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

0 200 400 600
Feet

1:4,000

0 100 200
Meters



Appendix D-6. New England Wind Phase 1 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

G:\Projects\3784.01 Vineyard Wind 501 South\Production\Mapping\Maps GIS\Monitoring Memo Phase 1 Sensitivity.mxd
Last saved: 7/31/2023

New England Wind Phase 1
(Park City Wind)/New England Wind Connector 1
Barnstable, Massachusetts

PAL: due diligence / assessment	5-22-2020
Epsilon: routes and parcels	4-20-2020
Basemap: USGS via ArcGIS Online	various

PAL makes no warranties, either expressed or implied, regarding the fitness or suitability of this map for any other purpose than to depict the results of cultural resource investigations conducted by PAL.

THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

KEY:

Existing West Barnstable Substation

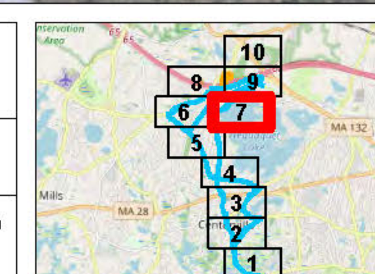
Archaeological Assessment:

- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

0 200 400 600 Feet

1:4,000

0 100 200 Meters



Appendix D-7. New England Wind Phase 1 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

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Last saved: 7/31/2023

New England Wind Phase 1
(Park City Wind)/New England Wind Connector 1
Barnstable, Massachusetts

PAL: due diligence / assessment	5-22-2020
Epsilon: routes and parcels	4-20-2020
Basemap: USGS via ArcGIS Online	various

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THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

KEY:

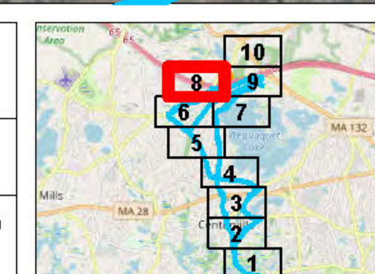
Existing West Barnstable Substation

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

0 200 400 600
Feet

1:4,000

0 100 200
Meters



Appendix D-8. New England Wind Phase 1 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

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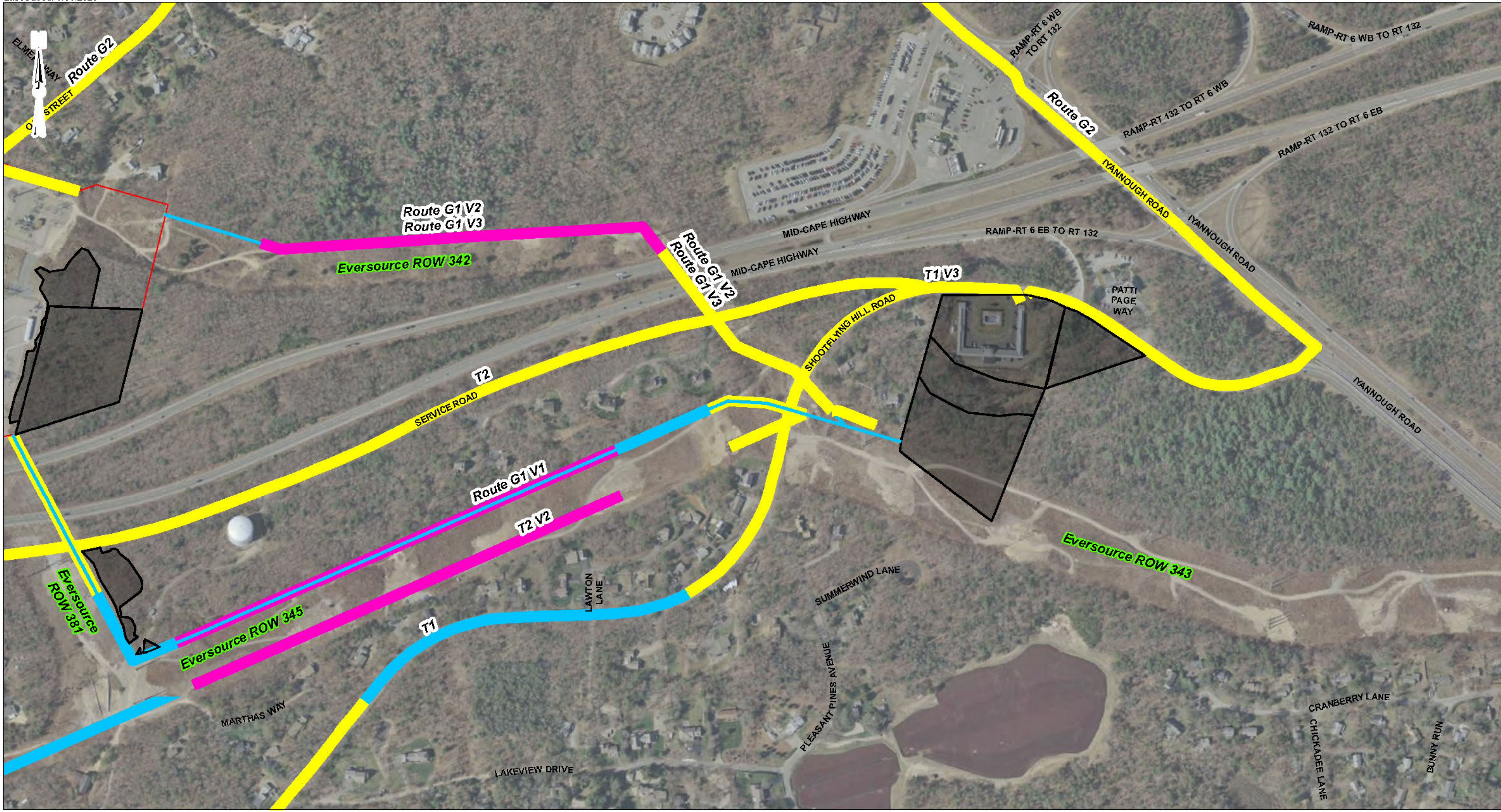
Last saved: 7/31/2023



PAL: due diligence / assessment	5-22-2020
Epsilon: routes and parcels	4-20-2020
Basemap: USGS via ArcGIS Online	various

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THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

KEY:

- Existing West Barnstable Substation

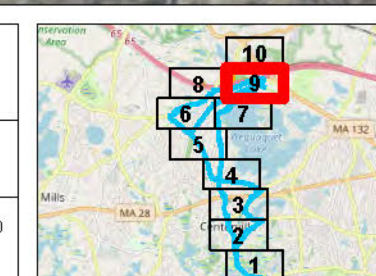
Archaeological Assessment:

- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

0 200 400 600
Feet

1:4,000

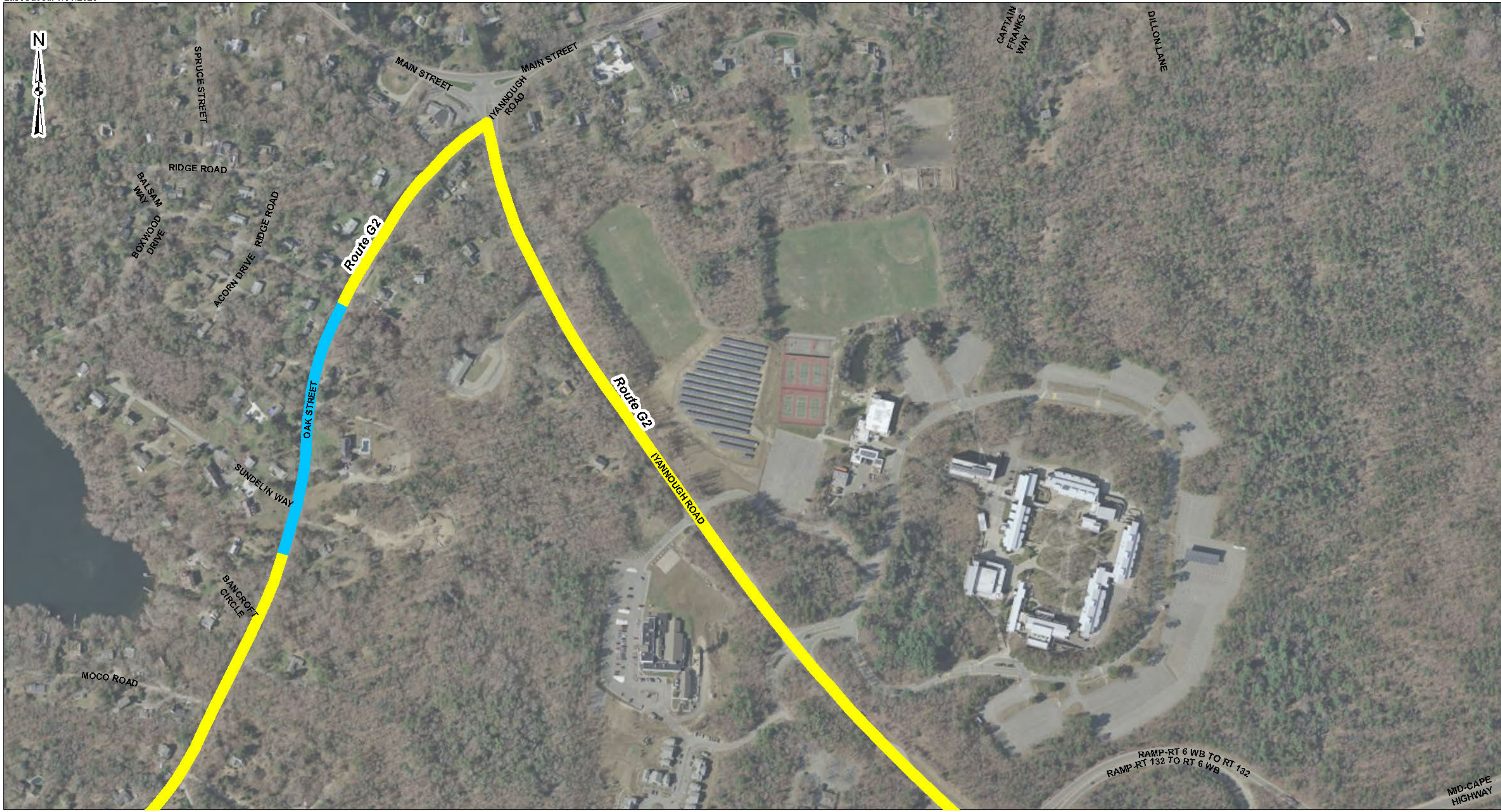
0 100 200
Meters



Appendix D-9. New England Wind Phase 1 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

Confidential Business Information. Not subject to disclosure under the Federal Freedom of Information Act, the Massachusetts Public Records Law pursuant to M.G.L. c. 4 §7(26), subclauses (d) and (g), and the Rhode Island Access to Public Records Act, R.I.G.L. §38-2, pursuant to Section 38-2-2(4)(B),(F) and (K).

G:\Projects\3784.01 Vineyard Wind 501 South\Production\Mapping\Maps GIS\Monitoring Memo Phase 1 Sensitivity.mxd
Last saved: 7/31/2023



New England Wind Phase 1
(Park City Wind)/New England Wind Connector 1
Barnstable, Massachusetts

PAL: due diligence / assessment	5-22-2020
Epsilon: routes and parcels	4-20-2020
Basemap: USGS via ArcGIS Online	various

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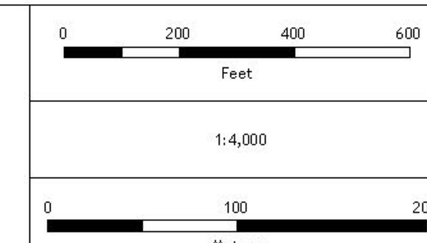
THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

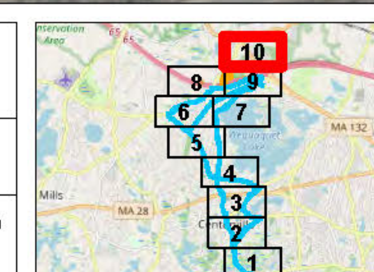
KEY:

Existing West Barnstable Substation

Archaeological Assessment:

- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required





Appendix D-10. New England Wind Phase 1 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

Confidential Business Information. Not subject to disclosure under the Federal Freedom of Information Act, the Massachusetts Public Records Law pursuant to M.G.L. c. 4 §7(26), subclauses (d) and (g), and the Rhode Island Access to Public Records Act, R.I.G.L. §38-2, pursuant to Section 38-2-2(4)(B),(F) and (K).

APPENDIX E

NEW ENGLAND WIND PHASE 2 ARCHAEOLOGICAL SENSITIVITY MAPS

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G:\Projects\3784.01 Vineyard Wind 501 South\Production\Mapping\Maps GIS\Monitoring Memo Phase 2 Sensitivity.mxd | Last saved: 10/5/2023

New England Wind Phase 2
(Commonwealth Wind)/New England Wind 2 Connector
Barnstable, Massachusetts

PAL

PAL: due diligence / assessment	12-13-2021
Epsilon: routes and parcels	12-6-2021
Basemap: MassGIS	2019

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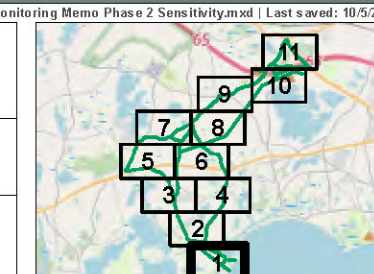
Onshore Export Cable HDD Route

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

0 200 400 600
Feet

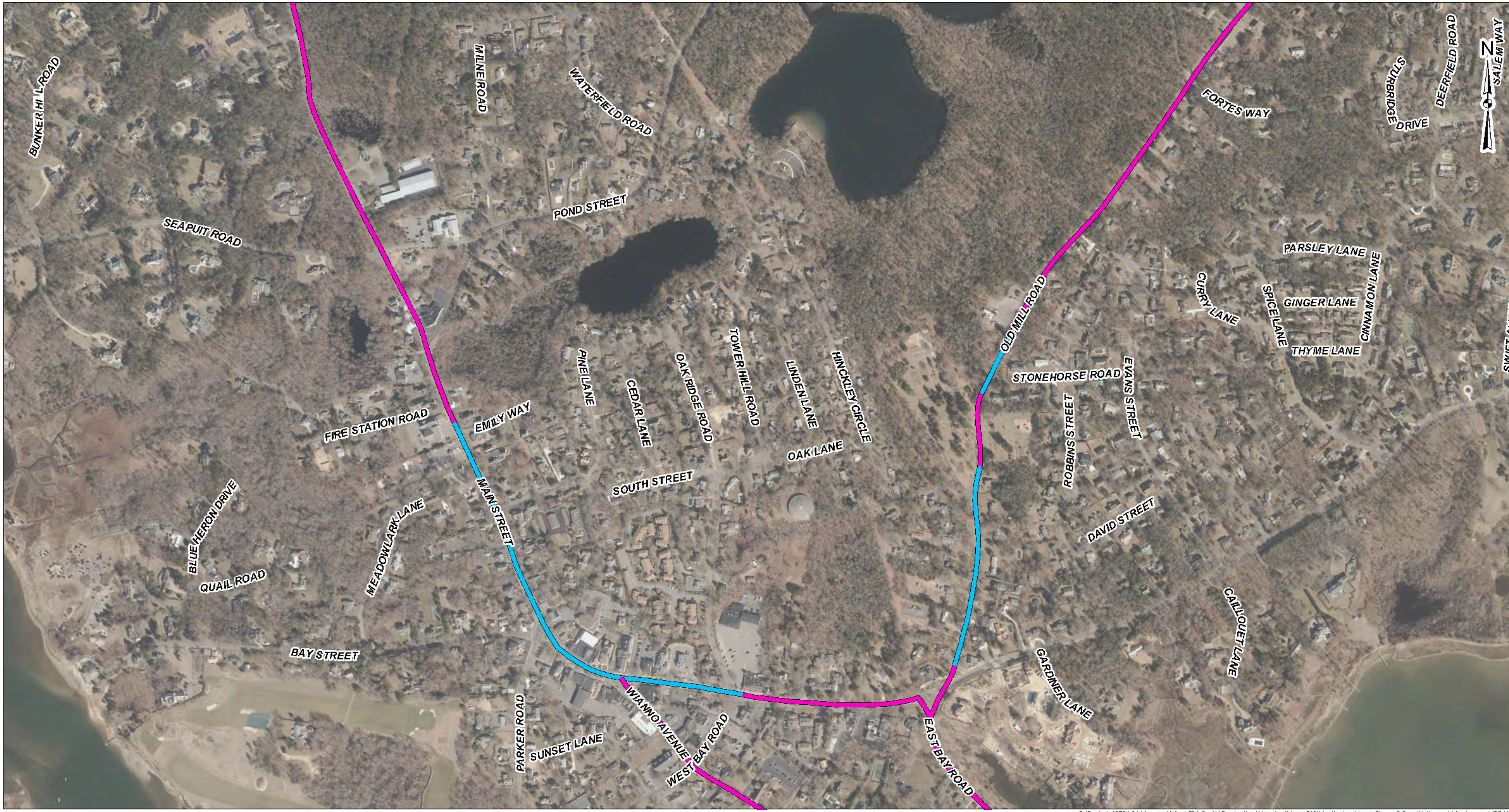
1:6,000

0 100 200
Meters



Appendix E-1. New England Wind Phase 2 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

Confidential Business Information. Not subject to disclosure under the Federal Freedom of Information Act, the Massachusetts Public Records Law pursuant to M.G.L. c. 4 §7(26), subclauses (d) and (g), and the Rhode Island Access to Public Records Act, R.I.G.L. §38-2, pursuant to Section 38-2-2(4)(B),(F) and (K).



G:\Projects\3784.01 Vineyard Wind 501 South\Production\Mapping\Maps GIS\Monitoring Memo Phase 2 Sensitivity.mxd | Last saved: 7/31/2023

New England Wind Phase 2
(Commonwealth Wind)/New England Wind 2 Connector
Barnstable, Massachusetts

PAL

PAL: due diligence / assessment	12-13-2021
Epsilon: routes and parcels	12-6-2021
Basemap: MassGIS	2019

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THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

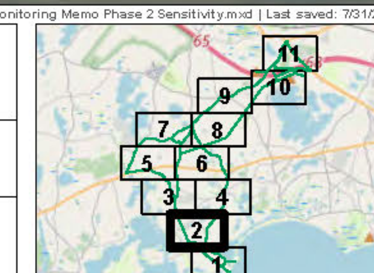
Onshore Export Cable HDD Route

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

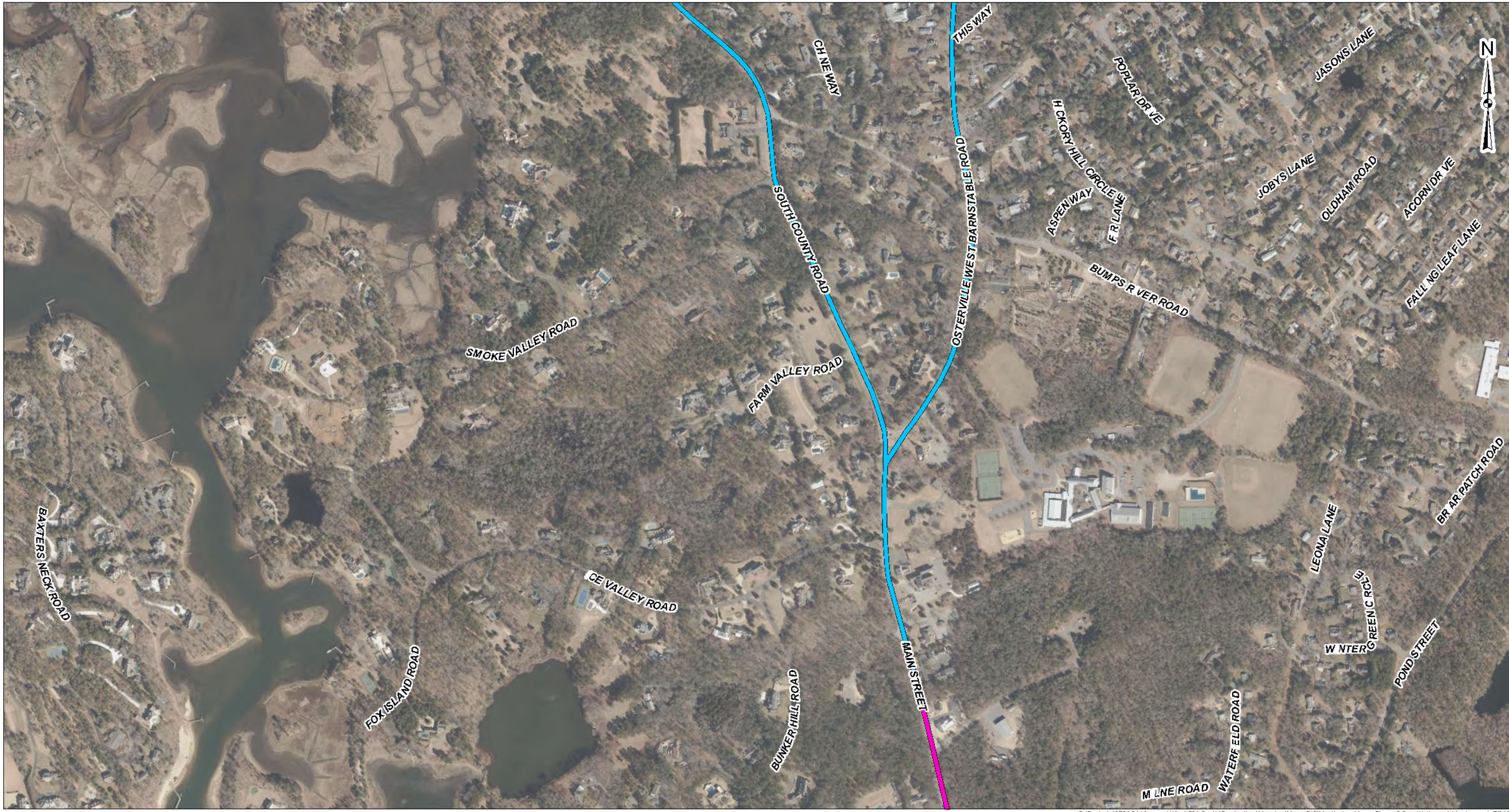
0 200 400 600
Feet

1:6,000

0 100 200
Meters



Appendix E-2. New England Wind Phase 2 Potential Onshore Export Cable Routes with Archaeological Sensitivity.



G:\Projects\3784.01 Vineyard Wind 501 South\Production\Mapping\Maps GIS\Monitoring Memo Phase 2 Sensitivity.mxd | Last saved: 7/31/2023

New England Wind Phase 2
(Commonwealth Wind)/New England Wind 2 Connector
Barnstable, Massachusetts

PAL	PAL: due diligence / assessment	12-13-2021
	Epsilon: routes and parcels	12-6-2021
	Basemap: MassGIS	2019

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THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

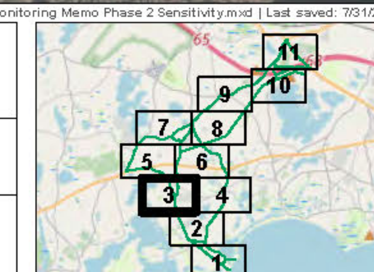
Onshore Export Cable HDD Route

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

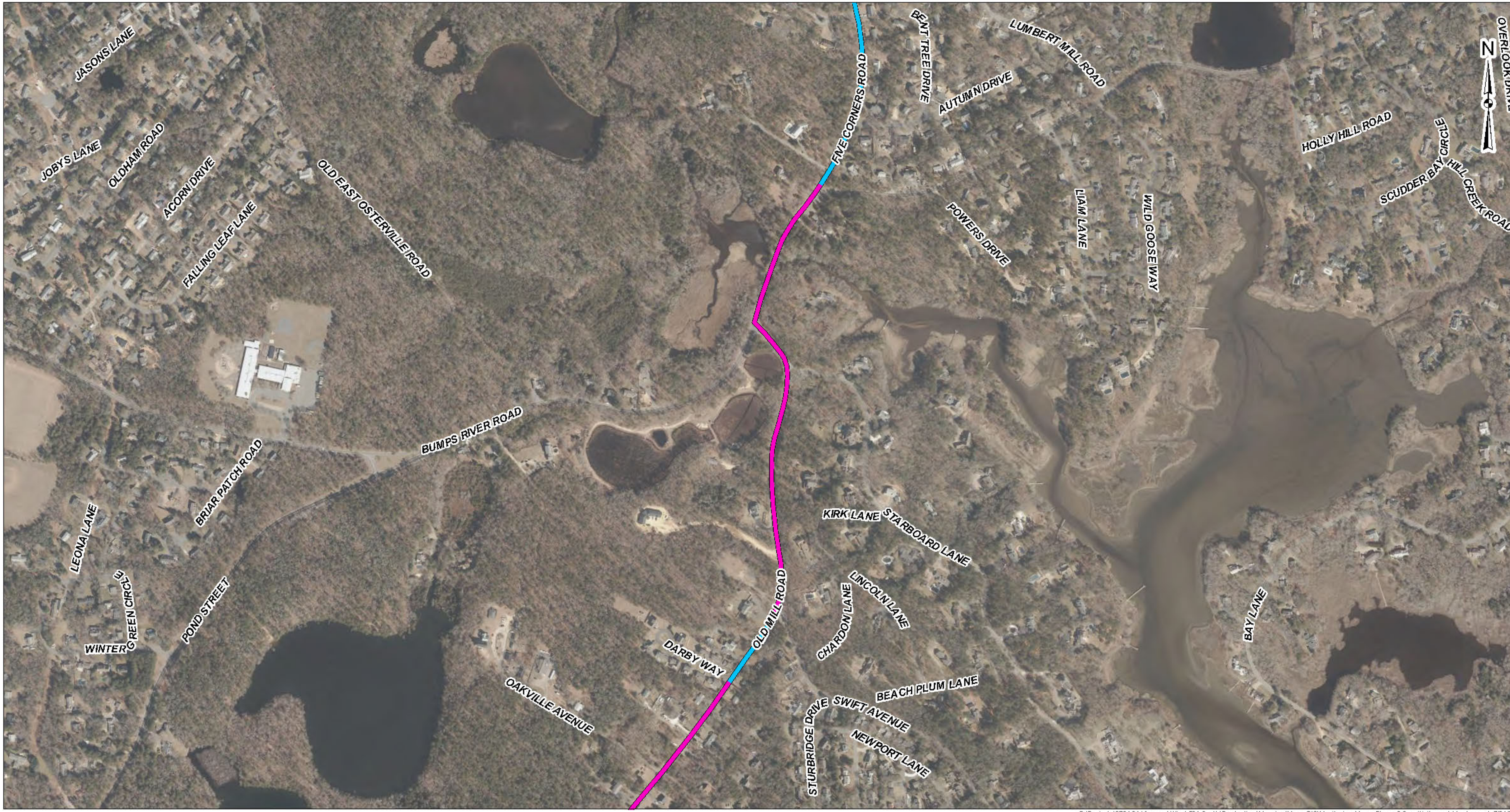
0 200 400 600
Feet

1:6,000

0 100 200
Meters



Appendix E-3. New England Wind Phase 2 Potential Onshore Export Cable Routes with Archaeological Sensitivity.



G:\Projects\3784.01 Vineyard Wind 501 South\Production\Mapping\Maps GIS\Monitoring Memo Phase 2 Sensitivity.mxd | Last saved: 7/31/2023

New England Wind Phase 2
(Commonwealth Wind)/New England Wind 2 Connector
Barnstable, Massachusetts

PAL

PAL: due diligence / assessment	12-13-2021
Epsilon: routes and parcels	12-6-2021
Basemap: MassGIS	2019

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THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

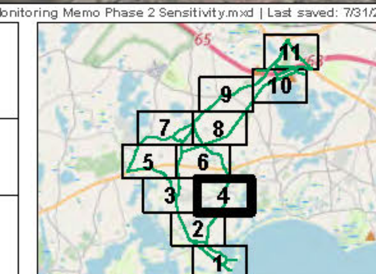
Onshore Export Cable HDD Route

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

0 200 400 600
Feet

1:6,000

0 100 200
Meters



Appendix E-4. New England Wind Phase 2 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

Confidential Business Information. Not subject to disclosure under the Federal Freedom of Information Act, the Massachusetts Public Records Law pursuant to M.G.L. c. 4 §7(26), subclauses (d) and (g), and the Rhode Island Access to Public Records Act, R.I.G.L. §38-2, pursuant to Section 38-2-2(4)(B),(F) and (K).

G:\Projects\3784.01 Vineyard Wind 501 South\Production\Mapping\Maps GIS\Monitoring Memo Phase 2 Sensitivity.mxd | Last saved: 7/31/2023

New England Wind Phase 2
(Commonwealth Wind)/New England Wind 2 Connector
Barnstable, Massachusetts

PAL: due diligence / assessment	12-13-2021
Epsilon: routes and parcels	12-6-2021
Basemap: MassGIS	2019

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THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

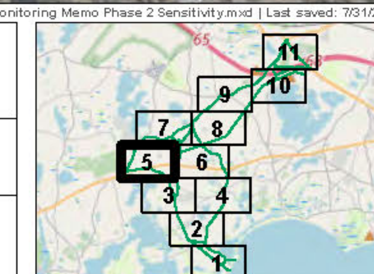
Onshore Export Cable HDD Route

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

0 200 400 600
Feet

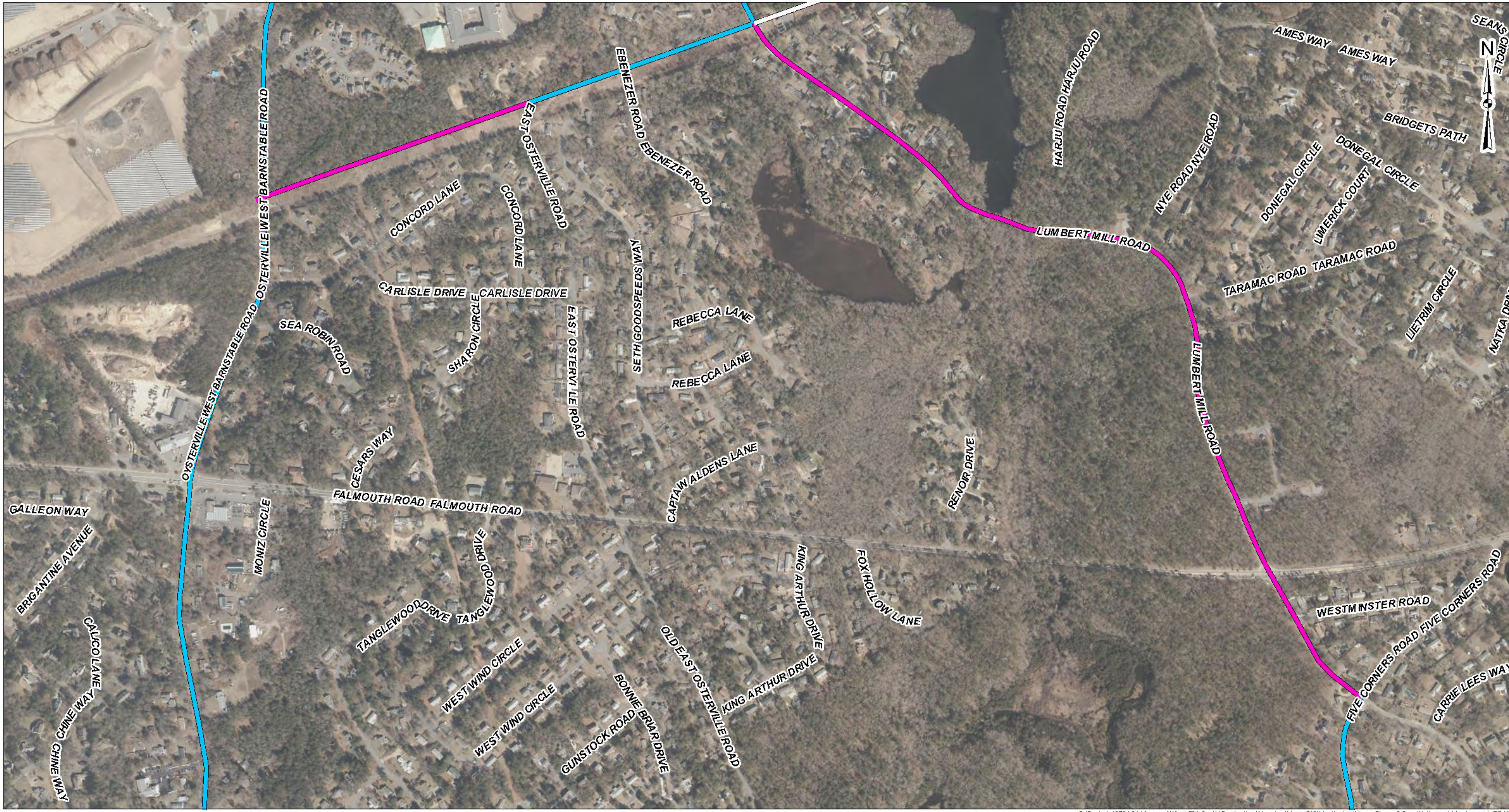
1:6,000

0 100 200
Meters



Appendix E-5. New England Wind Phase 2 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

Confidential Business Information. Not subject to disclosure under the Federal Freedom of Information Act, the Massachusetts Public Records Law pursuant to M.G.L. c. 4 §7(26), subclauses (d) and (g), and the Rhode Island Access to Public Records Act, R.I.G.L. §38-2, pursuant to Section 38-2-2(4)(B),(F) and (K).



G:\Projects\3784.01 Vineyard Wind 501 South\Production\Mapping\Maps GIS\Monitoring Memo Phase 2 Sensitivity.mxd | Last saved: 7/31/2023

New England Wind Phase 2 (Commonwealth Wind)/New England Wind 2 Connector
Barnstable, Massachusetts

PAL

PAL: due diligence / assessment	12-13-2021
Epsilon: routes and parcels	12-6-2021
Basemap: MassGIS	2019

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THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

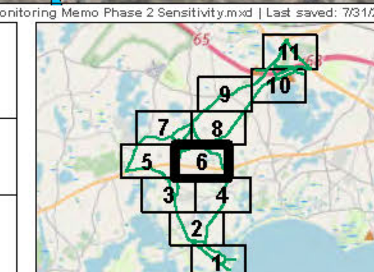
Onshore Export Cable HDD Route

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

0 200 400 600
Feet

1:6,000

0 100 200
Meters



Appendix E-6. New England Wind Phase 2 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

New England Wind Phase 2
(Commonwealth Wind)/New England Wind 2 Connector
Barnstable, Massachusetts

PAL: due diligence / assessment	12-13-2021
Epsilon: routes and parcels	12-6-2021
Basemap: MassGIS	2019

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THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

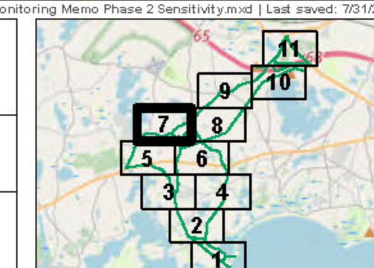
Onshore Export Cable HDD Route

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

0 200 400 600
Feet

1:6,000

0 100 200
Meters



Appendix E-7. New England Wind Phase 2 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

Confidential Business Information. Not subject to disclosure under the Federal Freedom of Information Act, the Massachusetts Public Records Law pursuant to M.G.L. c. 4 §7(26), subclauses (d) and (g), and the Rhode Island Access to Public Records Act, R.I.G.L. §38-2, pursuant to Section 38-2-2(4)(B),(F) and (K).

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New England Wind Phase 2
(Commonwealth Wind)/New England Wind 2 Connector
Barnstable, Massachusetts

PAL: due diligence / assessment	12-13-2021
Epsilon: routes and parcels	12-6-2021
Basemap: MassGIS	2019

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Onshore Export Cable HDD Route

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

0 200 400 600
Feet

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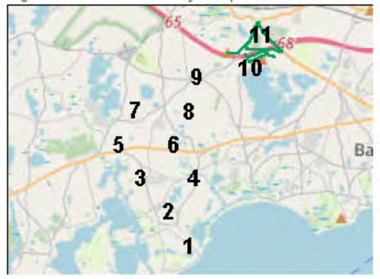
Meters



Appendix E-8. New England Wind Phase 2 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

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New England Wind Phase 2
(Commonwealth Wind)/New England Wind 2 Connector
Barnstable, Massachusetts

PAL

PAL: due diligence / assessment	12-13-2021
Epsilon: routes and parcels	12-6-2021
Basemap: MassGIS	2019

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Onshore Export Cable HDD Route

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

0 200 400 600
Feet

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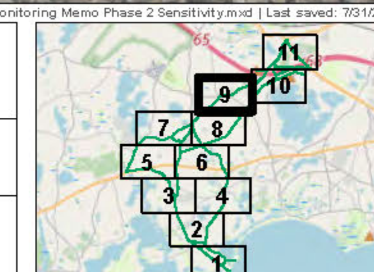
0 100 200
Meters



Appendix E-9. New England Wind Phase 2 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

New England Wind Phase 2
(Commonwealth Wind)/New England Wind 2 Connector
Barnstable, Massachusetts

PAL: due diligence / assessment	12-13-2021
Epsilon: routes and parcels	12-6-2021
Basemap: MassGIS	2019

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THIS MAP IS INTENDED FOR PLANNING PURPOSES ONLY

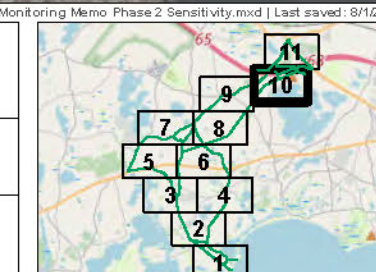
Onshore Export Cable HDD Route

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

0 200 400 600 Feet

1:6,000

0 100 200 Meters



Appendix E-10. New England Wind Phase 2 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

New England Wind Phase 2
(Commonwealth Wind)/New England Wind 2 Connector
Barnstable, Massachusetts

PAL: due diligence / assessment	12-13-2021
Epsilon: routes and parcels	12-6-2021
Basemap: MassGIS	2019

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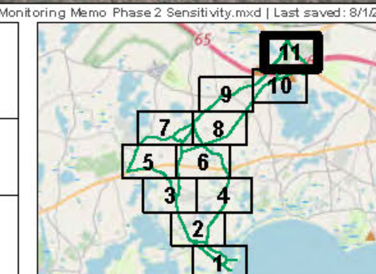
Onshore Export Cable HDD Route

Archaeological Assessment:
- High Sensitivity - Monitoring Required
- Moderate Sensitivity - Monitoring Required
- Low Sensitivity - No Monitoring Required
- Areas Archaeologically Tested - No Monitoring Required

0 200 400 600
Feet

1:6,000

0 100 200
Meters



Appendix E-11. New England Wind Phase 2 Potential Onshore Export Cable Routes with Archaeological Sensitivity.

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ATTACHMENT 14 – NEW ENGLAND WIND MITIGATION FUNDING OPTIONS

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MITIGATION FUNDING AMOUNTS PROPOSED BY THE LESSEE FOR NEW ENGLAND WIND PROJECT[1]

The mitigation measures proposed in the individual HPTPs have been developed by individuals who meet the qualifications specified in the SOI's Qualifications Standards for Archeology, History, Architectural History, and/or Architecture (36 CFR 61). The proposed mitigation measures consider the nature, scope, and magnitude of adverse effects caused by the Project, and the qualifying characteristics of each historic property that would be affected. The following funding amounts were identified by the Lessee to execute the proposed mitigation measures. These budgets are good faith estimates, based on the experience of qualified consultants with similar activities and comparable historic properties. The proposed level of funding is appropriate to accomplish the identified preservation goals and result in meaningful benefits to the affected properties, resolving adverse effects. In addition to the funding outlined below, the Lessee will provide reasonable compensation, if requested by a Tribal Nation, for participation in the implementation of the HPTPs.

- $1,800,000 for mitigation measures proposed by the Lessee and required by BOEM for mitigation to resolve adverse effects at the 49 SALs and Nantucket Sound TCP. This funding amount assumes unavoidable adverse effects to 49 SALs. However, the Lessee may be able to avoid adverse effects to some, and potentially all, of the SALs.

- $500,000 proposed by the Lessee and required by BOEM for mitigation to resolve adverse effects at the Vineyard Sound and Moshup's Bridge TCP

- $200,000 proposed by the Lessee and required by BOEM for mitigation to resolve adverse effects at the Edwin Vanderhoop Homestead and Gay Head-Aquinnah Shops Area

- $200,000 proposed by the Lessee and required by BOEM for mitigation to resolve adverse effects at the Chappaquiddick Island TCP

- $200,000 proposed by the Lessee and required by BOEM for mitigation to resolve adverse effects at the Gay Head Lighthouse

[1] The funding amounts presented are the totals for both phases of New England Wind. Distribution of the funding (including the schedule for distribution) will be dependent on financial close for each phase of New England Wind. If that portion of Lease OCS-A 0534 Phase 2 occupies is assigned and segregated in accordance with 30 CFR § 585.408 – 411 to an affiliated legal entity (the Assignee), the Assignee will be responsible for 60% of the funding amounts presented in this attachment.

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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
- Chappaquiddick Tribe of Wampanoag Nation
- Connecticut State Historic Preservation Office*
- County of Dukes
- County of Bristol
- The Delaware Nation
- Delaware Tribe of Indians (withdrew August 21, 2023)
- 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 Commission on Indian Affairs
- Massachusetts Historical Commission
- Mohegan Tribe of Indians of Connecticut
- 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
- The Narragansett Indian Tribe
- Office of the Deputy Assistant Secretary of the Navy for Environment
- Park City Wind
- Preservation Massachusetts

- Rhode Island Historical Preservation & Heritage Commission*
- The Shinnecock Indian Nation
- Town and County of Nantucket (withdrew August 27, 2020)
- Town of Aquinnah
- 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.

* Connecticut State Historic Preservation Office and Rhode Island Historical Preservation & Heritage Commission were initially invited to consult. After the APE was defined, BOEM determined that they no longer needed to participate.

Appendix K
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Appendix L
Glossary

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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 United States, 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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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

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Sangunett, Brandi	NEPA Coordinator
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Baker, Kyle	Marine Mammals, Sea Turtles
Bigger, David	Bats, Birds, Terrestrial Habitats and Fauna
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Conrad, Alex	Marine Acoustics
Cornelison, Meghan	Environmental Justice
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Klein, Kimberly	Marine Mammals, Sea Turtles
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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)
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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
Stromberg, Jessica	Chief, Environment Branch for Renewable Energy	Bureau of Ocean Energy Management
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NEPA = National Environmental Policy Act

Table M-3: Consultants

Name	Role/Resource Area	Company
Project Management/Coordinators		
Heater, Heather	Partner-In-Charge, All Sections	ERM
Steffen, Bradley	Project Manager, All Sections	ERM
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Stueber, Renee	Lead Document Manager / Technical Editor, All Sections	ERM
Olsen, Kim	Team Leader: Water Quality; Benthic Resources; Finfish, Invertebrates, and Essential Fish Habitat; Commercial Fisheries and For-Hire Recreational Fishing, Marine Mammals; Sea Turtles; National Marine Fisheries Service Biological Assessment, National Marine Fisheries Service Essential Fish Habitat Assessment	CSA
Subject Matter Experts		
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Ali, Aqsa	Geographic Information Systems	ERM
Barkaszi, Mary Jo	Marine Mammals, Sea Turtles, National Marine Fisheries Service Biological Assessment	CSA
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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
Luke Hanna	Senior Subject Matter Expert: Benthic Resources; Commercial Fisheries and For-Hire Recreational Fishing; Finfish, Invertebrates, and Essential Fish Habitat; Marine Mammals; National Marine Fisheries Service Biological Assessment; Sea Turtles	ERM
Hartigan, Kayla	Finfish, Invertebrates, and Essential Fish Habitat Marine Mammals, National Marine Fisheries Service Biological Assessment, National Marine Fisheries Service Essential Fish Habitat Assessment; Sea Turtles	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, National Marine Fisheries Service Essential Fish Habitat Assessment	ERM
Orue, Rebecca	Marine Mammals, National Marine Fisheries Service Biological Assessment; Sea Turtles	CSA
Robinson, Matthew	Scenic and Visual Resources, Seascape and Landscape Visual Impact Assessment, Cumulative Historic Resources Visual Effects Assessment	ERM
Sussman, Ben	Demographics, Employment, and Economics; Environmental Justice; Recreation and Tourism; Navigation and Vessel Traffic; Visual Resources	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; Sea Turtles	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
Wildey, Bennett	Air Quality	ERM

CSA = CSA Ocean Sciences, Inc.; ERM = Environmental Resources Management, Inc.

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Appendix N
List of Agencies, Organizations, and Persons to Whom Copies of the Statement Are Sent

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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 the Draft EIS initiated a 60-day comment period where government agencies, members of the public, and interested stakeholders provided comments and input. The Bureau of Ocean Energy Management (BOEM) accepted comments received or postmarked no later than February 21, 2023, 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.
- Through the regulations.gov web portal by navigating to http://www.regulations.gov and searching for docket number "BOEM-2022-0070."
- 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 used 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 (571) 474-6969 cheri.hunter@bsee.gov	Sterling, Virginia
National Oceanic and Atmospheric Administration, National Marine Fisheries Service	Sue Tuxbury (978) 281-9176 susan.tuxbury@noaa.gov	Gloucester, Massachusetts
U.S. Army Corps of Engineers	Christine Jacek (978) 318-8026 (978) 578-7548 christine.m.jacek@usace.army.mil	Concord, Massachusetts
U.S. Coast Guard	Michele DesAutels (617) 223-8068 michele.e.desautels@uscg.mil	Washington, D.C. Boston, Massachusetts
U.S. Environmental Protection Agency	Timothy Timmermann (617) 918-1025 Timmermann.Timothy@epa.gov	Boston, Massachusetts
Federal Participating Agencies		
Advisory Council on Historic Preservation	Chris Daniel (202) 517-0223 cdaniel@achp.gov	Washington, D.C.
Federal Aviation Administration	Cindy Whitten (816) 329-2528 Cindy.whitten@faa.gov	Washington, D.C.

Agency	Contact	Location
National Park Service	Kristen Andel (617) 564-7613 Kristen_Andel@nps.gov	Boston, Massachusetts
U.S. Department of Defense	Steven Sample (703) 571-0076 Steven.j.sample4.civ@mail.mil	Alexandria, Virginia
U.S. Department of the Navy	Matthew Senska (703) 614-2201 Matthew.senska@navy.mil	Washington, D.C.
U.S. Fish and Wildlife Service	David Simmons (603) 333- 5440david_simmons@fws.gov	Concord, New Hampshire

Table N-2: State Agencies

Agency	Contact	Location
State Cooperating Agency		
New York State Department of State	Laura McClean (315) 235-0351 Laura.McLean@dos.ny.gov	Albany, New York
State Participating Agencies		
Commonwealth of Massachusetts; Massachusetts Office of Coastal Zone Management	Lisa Berry Engler (617) 626-1230 lisa.engler@state.ma.us	Boston, Massachusetts
Rhode Island Coastal Resources Management Council	Jeffrey Willis (401) 783-3370 jwillis@crmc.ri.gov	Wakefield, Rhode Island
State of Rhode Island; Rhode Island Department of Environmental Management	Terry Gray (401) 222-2771 terry.gray@dem.ri.gov	Providence, Rhode Island
Connecticut State Historic Preservation Office, Connecticut Department of Economic and Community Development	Mary Dunne (860) 500-2356 mary.dunne@ct.gov	Hartford, Connecticut
Rhode Island Historical Preservation & Heritage Commission	Jeffery Emidy (401) 222-4134 jeffrey.emidy@preservation.ri.gov	Providence, Rhode Island
New York State Division for Historic Preservation	Tim Lloyd (518) 268-2186 timothy.lloyd@parks.ny.gov	Waterford, New York
Massachusetts Historical Commission	Brona Simon (617) 727-2816 brona.simon@sec.state.ma.us	Boston, Massachusetts

Table 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
	Connecticut State Historic Preservation Office
Local government	Cape Cod Commission
	County of Dukes
	Town of Aquinnah
	County of Bristol
	Town of Barnstable, Historical Commission
Nongovernmental organizations or groups	Alliance to Protect Nantucket Sound
	Martha’s Vineyard Commission
	Preservation Massachusetts
	Gay Head Lighthouse Advisory Board
Applicant	Park City Wind, LLC

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Appendix O
Responses to Comments on the Draft Environmental Impact Statement

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O Responses to Comments on the Draft Environmental Impact Statement

O.1 Introduction

On December 23, 2022, the Bureau of Ocean Energy Management (BOEM) published a Notice of Availability for the Draft Environmental Impact Statement (EIS), consistent with the regulations implementing the National Environmental Policy Act (NEPA; 42 United States Code [USC] § 4321 et seq.) to assess the potential impacts of the Proposed Action and alternatives (Notice of Availability of a Draft Environmental Impact Statement for the Park City Wind LLC's Proposed Wind Energy Facility Offshore Massachusetts, 87 Fed. Reg. 78993 [December 23, 2022]). The Draft EIS was made available in electronic form for public viewing at https://www.boem.gov/renewable-energy/state-activities/new-england-wind-formerly-vineyard-wind-south, and hard copies and/or CDs were delivered to libraries and other entities as specified in Appendix N of the Draft EIS. The NEPA review process requires agencies to allow the public the opportunity to comment on a Draft EIS. The Notice of Availability initiated a 60-day public comment period for the Draft EIS. The public comment period closed on February 21, 2023. This appendix describes the Draft EIS public comment processing methodology and definitions, and also includes responses to the substantive comments received on the Draft EIS, and/or describes where specific updates to the Final Environmental Impact Assessment (EIS) can be found in the document.

O.2 Objective

BOEM reviewed and considered all written and oral public submissions received during the Draft EIS public review and comment period. BOEM's goal was to identify comments to be addressed in this Final EIS, and to categorize those comments based on the applicable resource areas or NEPA topics. This categorization scheme allowed subject matter experts to review comments directly related to their areas of expertise and allowed BOEM to generate statistics based on the resource areas or NEPA topics addressed in each of the comments. All public comment submissions received can be viewed online at http://www.regulations.gov by typing "BOEM-2022-0070" in the search field.

O.3 Methodology

O.3.1 Terminology

The following terminology is used throughout this appendix:

- Submission: The entire content submitted by a single person or group at a single time. For example, a 10-page letter from a citizen, an email with a portable document format (PDF) attachment, and a transcript of an oral comment given at a public hearing meeting were each considered to be a submission.
- Comment: A specific statement within a submission that expresses a sender's specific point of view, concern, question, or suggestion. A comment can consist of more than once sentence, as long as those grouped sentences express a single idea. One submission may contain many comments.
- Substantive Comment: Draft EIS submissions were reviewed to identify and categorize "substantive" comments. To be substantive, a comment must relate to the reasonably foreseeable impacts of the Proposed Action, alternatives, or cumulative actions and do one or more of the following:
  - Question (with supporting rationale) the accuracy of information in the Draft EIS

  - Question (with supporting rationale) the adequacy of, methodology for, or assumptions used for the environmental analysis
  - Present new information relevant to the analysis
  - Present reasonable alternatives or mitigation measures other than those analyzed in the Draft EIS
  - Present or cause modifications to alternatives or mitigation measures analyzed in the Draft EIS
  - Correct factual errors in the content of the Draft EIS
- • General Comment: General comments are comments other than substantive comments. General comments may: (1) express interest or concern regarding an impact topic without providing specific comments on the information, methods, or findings presented in the Draft EIS, (2) express general support for or opposition to the proposed Project, or (3) comment on a topic unrelated to the proposed Project.

O.3.2 Comment Submittals

Federal agencies, state/local/tribal governments, and the general public had the opportunity to provide comments on the Draft EIS via the following mechanisms:

- Electronic submissions via www.regulations.gov on docket number BOEM-2022-0021;
- Hard-copy comment letters submitted to BOEM via traditional mail; and
- Comments submitted verbally at each of the public hearings.

BOEM held three online public hearings via Zoom to solicit verbal comments to inform preparation of the Final EIS. The hearings were free and open to the public with no reservations required. Locations and dates of these hearings are outlined in Table O.3-1.

Table O.3-1: Public Hearings

Date	Time	Location
January 27, 2023	1:00 p.m. Eastern Time	Zoom Webinar
February 1, 2023	5:00 p.m. Eastern Time	Zoom Webinar
February 6, 2023	5:00 p.m. Eastern Time	Zoom Webinar

All submissions initially provided by methods other than www.regulations.gov, including the transcripts of comments recorded at each public hearing listed in Table O.3-1, were uploaded to the docket. Each submission, including testimony by individual speakers at the public hearings listed in Table O.3-1, was assigned a unique identification number. That unique Submission ID was retained throughout the comment management process, for both submissions and the individual comments within those submissions.

O.3.3 Comment Processing

BOEM downloaded and reviewed all submissions from regulations.gov. These submissions were provided in Hypertext Markup Language (html) format, while attachments provided by stakeholders as part of their Regulations.gov submission were typically provided in PDF or Microsoft Word format. Text from the html, as well as PDF, Word, and other text formats were parsed, coded, and exported into a single Microsoft Excel file that served as the primary submission database. In cases where an attachment did not contain comments specific to the docket for the Ocean Wind 1 Draft EIS, the attachment was retained separately for BOEM reference as applicable, linked to the main body of the submission through the unique Submission ID. Examples of this type of attachment include copies of comment letters that were originally submitted during the scoping period, copies of comment letters that were originally submitted on another docket, or attached photos, published reports, news articles, or other secondary material. The submission database also included information about each submission, including the submitter's contact information, submission date, and whether the submitter was a government entity or agency.

Each submission and all oral testimony were read to identify individual substantive and general comments (as defined under Section O.3.1, Terminology). Each comment was parsed, coded, and exported to a spreadsheet that served as the master comment database. Each comment then received a unique comment ID number, tied to the Submission ID. For example, the fourth comment identified in regulations.gov submission 0001 was identified as BOEM-2022-0021-0001-0004.

Substantive comments from cooperating agencies and the lessee were organized by agency or organization and presented verbatim in Sections O.4 and O.5. Other agency, stakeholder, and public comments were each assigned to one section of the Draft EIS, based on the document's table of contents, or to a general topic such as "NEPA/Public Involvement Process." Substantive comments are presented verbatim in Section O.6. General comments are summarized in Section O.7. and the specific comments that contributed to a comment summary are identified by comment number.

Anonymous comments were not included in the comment database. As noted in the NOA, "BOEM does not consider anonymous comments. Please include your name and address as part of your comment. BOEM makes all comments, including the names and addresses of respondents, available for public review online and during regular business hours."

O.4 Responses to Cooperating Agency Comments on the Draft Environmental Impact Statement

O.4.1 Cooperating Federal Agencies

A complete list of cooperating federal agencies is provided Appendix A, Required Environmental Permits and Consultations. No formal comments on the Draft EIS were provided by Bureau of Safety and Environmental Enforcement (BSEE), the Federal Aviation Administration (FAA), or the U.S. Fish and Wildlife Service (USFWS). The following tables provide formal comments on the Draft EIS from the remaining cooperating federal agencies and the responses to those comments.

O.4.1.1 Advisory Council on Historic Preservation

Table O.4-1: Responses to Comments from the Advisory Council on Historic Preservation

Comment	Response
The ACHP reminds the BOEM that the Section 106 process does not establish a proportionality requirement regarding the resolution of adverse effects; however, a federal agency must meet the procedural of requirements of the regulations, which are exemplified through making a reasonable and good faith effort to consult and meaningfully consider and respond to consulting party input. This includes consulting on differences over the substance of the mitigation measures and where possible reaching agreement. We encourage the BOEM and Park City Wind to be receptive to such input from consulting parties as it considers the broadest spectrum of approaches to resolve adverse effects to historic properties, while also considering costs and implement-ability.	Appendix A of the EIS presents the consultations that have occurred for this Project.
ACHP would also like to emphasize the importance to providing for adequate consultation regarding treatment measures identified for those historic properties of religious and cultural significance to Indian tribes. We highlight the importance of providing avenues and time for Tribes to respond to these measures given the number of parallel consultations and workload constraints. The ACHP is an appreciative of the current measures presented in the draft MOA; however, given the cumulative nature of adverse effects to these properties from other offshore wind projects, the ACHP urges the BOEM and the applicant to consider, in consultation with Tribes, the largest spectrum of measures to resolve adverse effects.	Appendix E of the Draft EIS addressed this comment, and describes the Planned Activities Scenario evaluated in the EIS. In addition, the cumulative Historic Properties Visual Effects Assessment has also been provided to Tribes and other Consulting Parties.
given the number of envisioned treatment plans, the ACHP sees merit in the BOEM considering consolidating mitigation measures in the form of undertaking-wide mitigation approaches, such as context studies, local initiatives, or mitigation funds, which might be pursued in place of individual treatment plans. The ACHP sees these approaches as beneficial to avoiding challenges that might occur in finalizing treatment plans as well as representing tools that more broadly account for cumulative effects of the undertaking. These measures could also align with and bolster existing and future measures to resolve adverse effects, given the reasonably foreseeable future wind development in the surrounding area. When developed, as part of the Section 106 process, these measures can be useful for achieving broader preservation objectives and reflective of public values.	BOEM recognizes the benefits of undertaking-wide mitigation approaches as suggested by the ACHP and is willing to consider such an approach upon request by additional consulting parties. In fact, at the request of consulting parties for other Projects, BOEM has included a mitigation fund as a mitigation measure to replace individual HPTPs. Consultation on the resolution of adverse effects from this Project is ongoing and any suggested measures from consulting parties can be considered.

Comment	Response
[Draft MOA] How will the RI SHPO NAE [Rhode Island State Historic Preservation Office No Adverse Effect] be documented?	Appendix J of the Final EIS (the Draft MOA) has been revised to address this comment.
[Draft MOA] The preamble needs to be revised to better reflect the ACHP's involvement to date, which was first through FAST-41, then our NEPA sub notice and now with the AE finding participation under 106.	Appendix J of the Final EIS (the Draft MOA) has been revised to address this comment.
[Draft MOA page 4, top] This clause should include a reference to 36 CFR § 800.4(b)(2).	Appendix J of the Final EIS (the Draft MOA) has been revised to address this comment.
[Draft MOA page 8, mitigation measures committed to by Park City Wind] Is there a cost parameter for these?	The funding amounts for specific mitigation measures have not yet been determined as consultation remains ongoing (BOEM 2023; Appendix J). Cost parameters will be provided in future revisions to the MOA.
[Draft MOA page 9] Does development mean construction?	As this HPTP is further developed with the input of consulting parties, this ambiguity in language will be addressed and clarified in the MOA.
[Draft MOA section XVI] This should be the last line in the MOA.	Appendix J of the Final EIS (the Draft MOA) has been revised to address this comment.

O.4.1.2 U.S. Environmental Protection Agency

Table O.4-2: Responses to Comments from U.S. Environmental Protection Agency

Comment	Response
Power generated from the project will have potential local air quality benefits as fossil fuel generation is displaced over time and is intended to help Connecticut and Massachusetts meet their individual state climate targets. The project is also consistent with the Departments of Interior (DOI), Energy (DOE), and Commerce (DOC) shared goal to deploy 30 gigawatts (GW) of offshore wind in the United States by 2030.	Thank you for your comment.
Section G.2.1.1, Figure G.2.1-1...EPA notes that according to the scale on Figure G.2.1-1, it appears that statute miles were used to depict the geographic analysis area. However, EPA interprets the regulations at 40 CFR part 55 to use nautical miles for the purposes of determining potential emissions from the source...Furthermore, EPA's permitting scope extends 25 miles around the offshore wind development area. EPA recommends that the Final EIS clarify the metric used the in geographic analysis area and consider expanding the analysis area for offshore construction to correspond with the area analyzed in EPA's permitting action.	Section G.2.1.1 of the Final EIS has been revised to address this comment.
Appendix G (pg. G-57) of the Draft EIS indicates that 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. For Vineyard Wind 1 and South Fork Wind, EPA required Tier 3 and 4 engines located on WTGs and offshore substations, as well as Tier 4 engines for project vessels operating as OCS sources with allowances for lower tiered engines if those vessels with associated engines are not available at the time of deployment. Recommended Action: EPA recommends that the Final EIS acknowledge past determinations made by EPA on previous permits for engines operating on offshore substations and WTGs and consider building in conditions that mimic past requirements for the use tier-compliant engine standards. Additionally, EPA recommends acknowledging the vessel engine requirements in past EPA permits and consider adopting a similar structure in the Final EIS. Furthermore, EPA recommends that as an additional mitigation measure BOEM require New England Wind to pursue the procurement of the most efficient and lowest emitting vessels available during the vessel-contracting stage of the project. As part of this process, the Final EIS should provide a discussion of the various options that are available to reduce these emissions. The Final EIS should consider options for reducing emissions from offshore activity, such as the purchase of lower emitting or electrified crew vessels.	The OCS air permit will outline requirements on the type(s) of engines or control devices that should be used to support this project. These requirements will compare potential requirements with past WTG projects and will include both off-shore and on-shore activities. Text has been revised to acknowledge the potential for these additional requirements.

Comment	Response
Appendix G of the Draft EIS does not indicate that there are no Class I areas within the geographic analysis area. [The applicant] is required to conduct air quality modeling of emission sources that will be located on the OCS. [The applicant] will need to provide an analysis demonstrating that ambient impacts from Phase 1 and Phase 2 will not affect protected Class I area. This information would likely benefit BOEM's analysis of air quality impacts.	Section G.2.1 of the Final EIS has been updated to address Class I areas.
Appendix G (pg. G-58) of the Draft EIS indicates that 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. Recommended Action: EPA encourages BOEM to explore options to require alternate power sources such as battery backup or fuel cell technology to provide emergency power during operations. These options should be described in the Final EIS.	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 proposed Project may require emergency generators at times, potentially resulting in increased emissions for limited periods. Appendix H of the Final EIS includes the mitigation and monitoring measures that BOEM could implement in the ROD.
Section G.2.1.1 (pg. G-48) of the Draft EIS indicates that construction ports are listed as a potentially impacted area. Many port communities are in areas that may have existing air quality issues and/or environmental justice concerns. Recommended Action: EPA recommends that the Final EIS explore the feasibility of requiring emission reduction best practices for ports such as vessel speed reduction requirements, sulfur restrictions in fuel, the use of marine shore power systems, and the use of Tier 4 Final EPA certified equipment. More information regarding air emissions reduction methods at ports can be accessed at https://www.epa.gov/ports-initiative.	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)."

Comment	Response
Appendix G, page 52 states: ""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."" Recommended Action: EPA recommends that BOEM conduct an analysis to determine whether emissions not covered by the OCS permit, particularly those emissions originating within the nonattainment area boundaries, will cause or contribute to a new violation of the NAAQS, increase the frequency or severity of any existing violation of the standards, or delay timely attainment of the standards. Furthermore, EPA recommends that BOEM include more detailed information on mitigation measures or emissions offsets such as the purchase of lower emitting (e.g., Tier 4) or electrified crew vessels and equipment.	The sources and activities not regulated through the OCS permit include construction equipment and vehicles used during the unloading and loading of components at the port facilities, during construction at the landfall sites, during installation of the onshore cables, and during construction of the onshore substations, further described in Section 2.1, and 2.2.5 through 2.2.8 of COP Volume III. The air emissions from these sources and activities would be under the jurisdiction of the local regulatory agency, of which the applicant may be required to conduct analyses and obtain permits and approvals, as applicable. However, due to the temporary and mobile nature of these sources and activities, it is expected that they will be exempt from air permit regulations and requirements.
Appendix G, page 58 states: ""Both NOx and VOC are O3 precursors, and these emissions may contribute to some increase in O3production during construction. There would be minor air quality impacts due to construction of Phase 1."" Page 60 states, ""[t]here would be minor air quality impacts due to the construction of Phase 2."" Recommended Action: EPA recommends the air quality analysis include information comparing the modelled concentrations to the NAAQS, state air quality standards, or other relevant reference measures, which would allow for a more quantitative assessment to determine if emissions would adversely impact the air quality resource. Absent such a comparison, it is unclear how a determination of minor air quality impacts can be made.	With the designation of minor or moderate, it is expected that there will be detectable increases in ambient pollutant concentrations from the proposed Project. Most construction emissions will occur from off-shore construction activities, which will be covered under an OCS air permit with the USEPA. This includes documentation that emissions will not cause or contribute to air pollution in excess of a NAAQS or applicable maximum allowable increase over the baseline concentration in any area under the PSD program. The applicant will comply with the conditions of the OCS Air Permit, which will minimize and mitigate emissions. More detailed information on expected OCS Air Permit conditions and other measures to avoid, minimize, and mitigate impacts to air quality is provided in Sections 5.1.2.1.2 and 5.1.2.2.2 of COP Volume III. Additionally, a table outlining the emission inventory for the non-attainment counties was added to Appendix G to provide a better quantitative comparison for project related emissions versus emissions from nonattainment counties.

Comment	Response
The Draft EIS states that potential environmental justice (EJ) impacts at specific ports cannot be evaluated because BOEM is not certain which ports may be utilized for this project; and, further, that near-port communities with EJ concerns could experience disproportionate air quality impacts depending on the ports that are used, ambient air quality, and the increase in emissions at any given port. The Draft EIS states that port facilities in New York, New Jersey, Connecticut, Massachusetts and Rhode Island could be used for berthing, staging, and loadout to support the construction and installation of offshore facilities. Recommended Action: Localized EJ impacts at the ports being considered for usage should be fully identified in the Final EIS for the selected alternative and affected communities, including port communities, should be given an appropriate opportunity to comment based on targeted outreach from BOEM. Additionally, port expansion and modifications to support the development of offshore wind infrastructure that may lead to increased port utilization constitute a reasonably foreseeable, indirect effect of the Proposed Action. Such impacts to communities with EJ concerns adjacent to such ports should be considered and disclosed.	As stated in the Draft EIS, the applicant is not conducting any port expansion activity specifically to support the proposed Project. Evaluations of any such expansions (including environmental justice evaluations) would be part of the permitting process for specific expansions.
While the Draft EIS analyzes other ongoing and reasonably foreseeable future activities, as currently written, BOEM's EJ analysis does not consider these cumulative impacts in the determination of disproportionately high and adverse impacts. In accordance with the Promising Practices for EJ Methodologies in NEPA Reviews, ""agencies may wish to consider factors that can amplify identified impacts (e.g., the unique exposure pathways, prior exposures, social determinants of health) to ensure a comprehensive review of potential disproportionately high and adverse impacts to minority populations and low-income populations."" CEQ's guidance, Environmental Justice: Guidance Under the National Environmental Policy Act (1997) also encourages agencies to consider relevant public health and industry data concerning the potential for multiple or cumulative exposures to human health or environmental hazards in the affected population and historical patterns of exposure to environmental hazards, to the extent such information is reasonably available. . . even if certain effects are not within the control or subject to the discretion of the agency proposing the action"". Recommended Action: BOEM should consider how relevant existing conditions in communities with EJ concerns across cumulative environmental, health, socioeconomic and climate stressors may ultimately lead to impacts that are disproportionately high and adverse. Please refer to a number of tools such as the Environmental Justice Screening and Mapping Tool (EJ Screen) and the Center for Disease Control and Prevention's Environmental Justice Index to obtain information on pre-existing pollutant and health burdens that may inform the cumulative impacts analysis.	The analysis in the Final EIS uses EJScreen percentiles, data and maps that address state-level analytical requirements, and NOAA Social Indicators mapping. The CDC EJ Index and CEQ Justice 40 tool use different (less accurate and out of date) census data, and thus were not used. The analysis provided in the Final EIS is sufficient to fulfill the purpose of NEPA: to enable a reasoned choice among alternatives.
Communities with EJ concerns are often disproportionately burdened by environmental hazards and stressors, unhealthy land uses, psychosocial stressors, and historical traumas, all of which drive environmental health disparities. Recommended Action: BOEM should analyze whether communities impacted by this project may already be experiencing existing pollution and social/health burdens. Additionally, BOEM should further describe the health effects of impacts.	The analysis in the Final EIS uses EJScreen percentiles, data and maps that address state-level analytical requirements, and NOAA Social Indicators mapping, which incorporate information about existing burdens, including health burdens.

Comment	Response
EPA recommends that BOEM develop a stakeholder outreach/EJ public participation plan for areas that may be impacted by the proposed action and provide an opportunity for affected communities to inform the project's mitigation measures. This includes communities in Barnstable County and Bristol County, MA, that are proposed landfall sites for offshore export cables and onshore substation(s). An appropriate public participation process for this project would include: A forward-looking outreach plan that includes detailed information on planned engagement milestones and commitments to meetings with potentially impacted communities and community organizations. Development of a brief community information sheet about the project that is written in plain language and that can be understood by all affected community members. The information sheet should be distributed as widely as possible, through posting on BOEM's project specific website and shared with parties who provided comments on the Notice of Intent for the project and the Draft EIS. Use of screening tools such as EPA's EJ Screen, supplemented with local knowledge, to determine if linguistically isolated populations reside in geographic areas impacted by the proposed project and provide appropriate translation and interpretation services to ensure meaningful engagement. Often the best way to assess translation and interpretation needs is to connect with people who live in impacted communities, including local government officials and community-based non-governmental organizations. Public meetings or hearings designed to be accessible to all and scheduled at times that accommodate the greatest number of participants.	Thank you for your comment. BOEM will consider this information as part of its ongoing stakeholder outreach efforts, and will also pass this information to the applicant for use in their ongoing stakeholder outreach efforts.
Explain whether any future supplemental NEPA analysis of the [South Coast Variant] will revisit the alternatives analyses from the first round with the new alternative (e.g., SCV) included in the overall mix. Develop and present information to explain if there are technical or grid interconnection issues, etc. at the West Barnstable substation that would require development of the SCV. As many sub-alternative scenarios may include the SCV, please provide more detailed information to explain whether alternatives incorporating the SCV represent the least environmentally damaging practicable alternative (LEDPA) under the Clean Water Act Section 404(b)(1) guidelines. Explain whether use of the SCV will require HVDC export. If so, please explain the effect on the number and impacts of ESPs, including the potential need for water-based cooling systems and associated NPDES discharges.	The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.
EPA recommends that the Final EIS analysis of alternatives contain a substantive discussion of how the selected alternative is consistent with the CWA Section 404(b)(1) Guidelines to support permitting by the U.S. Army Corps of Engineers. Such a discussion would demonstrate how the proposed/selected alternative qualifies as the LEDPA.	Section 2 of the Draft EIS included the required alternative analysis to support the NEPA analysis and the Final EIS has been updated to include the preferred alternative. Appendix A of the Final EIS has updated the status of permits and consultations required for the proposed Project. USACE is the agency that would be responsible for regulating activities under Section 404 of the Clean Water Act. In addition, Appendix A includes information on the coordination and consultation process to date for the proposed Project, and as noted in Appendix A, USACE is a cooperating agency in the preparation of the EIS.

Comment	Response
The analysis of export cable routes for the Vineyard Wind 1 project are presented in Appendix 1-G. However, sub-alternatives within the Western OECC presented in the Vineyard Wind OECC analysis, or other alternative cable routes do not appear to have been fully considered as part of the New England Wind Phase 1 cable route analysis. Phase 2 cable routing alternatives are described as ""scenarios". Recommended Action: We recommend that the Final EIS present a discussion of the range of alternatives considered for the Phase 1 cable route and that the Phase 2 routes be analyzed as sub-alternatives.	Section 2 of the Draft EIS stated that the Phase 1 OECC would be the same for all alternatives, and would route cables through Eastern Muskeget, and Phase 2 OECC could utilize either the Eastern or Western Muskeget Channel. Section 2 of the Final EIS has been updated to include Table 2.1-2 that provides a summary of the export cable scenarios for each alternative.
The Draft EIS (page 3.7-49) notes, "Currently, there is a large amount of uncertainty around large whale response to offshore wind facilities due to the novelty of this type of development on the Atlantic OCS. Monitoring studies would be able to determine more precisely any changes in whale behavior. Based on the best available information, no changes are anticipated. However, long-term, intermittent, and minor impacts on foraging, migratory movements, or other important behaviors may occur as a result of Phase 1. Additionally, temporary displacement from the SWDA during proposed Project construction into areas with higher risk of interactions with fishing and commercial vessels (see traffic IPF below) may also contribute to impacts on marine mammals." Recommended Action: We recognize the acknowledgement of uncertainty provided in the Draft EIS regarding project impacts to large whales because of construction and operation of the proposed project. The Final EIS should explain in detail the steps BOEM will take to reduce this uncertainty. We also encourage BOEM to continue to work closely with the National Marine Fisheries Service to develop appropriate measures to avoid impacts to whale habitat and behavior during project construction and operation. These measures should include a detailed monitoring and mitigation plan.	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).
The Draft EIS states (p. 3.6-11), ""EMF does not appear to constitute a barrier to migration (Kavet et al. 2016)."" Kavet et al. (2016) only studied potential effects from DC cables, and the paper cautioned in its conclusions that the modeling results would not apply to 10 buried alternating current (AC) power cables for which modeling would be more complex. Recommended Action: EPA recommends the Final EIS cite a reference regarding EMF effects from AC cables."	Section 3.6 of the Final EIS has been updated to clarify that the Kavet et al. reference only pertains to DC cables, and that "there is no evidence to indicate that EMF from submarine AC power cables affects commercially and recreationally important fish species within the New England area (CSA Ocea Sciences, Inc. and Exponent 2019)."

Comment	Response
The Draft EIS states (p.3.4-10), ""Some benthic species can detect EMF, although EMF does not appear to present a barrier to animal movement."" In this case, no supporting citation is offered. Recommended Action: EPA recommends the Final EIS cite a reference regarding EMF effects from AC cables.	The Final EIS has been updated.
The Draft EIS also states, ""Burrowing infauna may be exposed to stronger EMF, but little information is available regarding the potential consequences."" (p. 3.6-11). Here and elsewhere, the Draft EIS points to limited research on the effects of EMF on marine organisms, but then suggests impacts from exposure to EMFs will likely be minor or negligible due to the lack of demonstrated effects. Recommended Action: Given the thousands of miles of cable that will be carrying either AC or DC currents throughout various habitats and water depths on the seafloor in New England and Mid-Atlantic waters, EPA recommends that BOEM address this concerning lack of understanding of EMF effects on both commercial and non-commercial marine and estuarine species through the support of peer-reviewed studies. EPA recommends that the BOEM Final EIS include a specific plan for addressing the research needs for this important issue.	The best available science was used to evaluate potential impacts from EMF and adequate cable burial depths. BOEM, the U.S. Department of Energy, and the U.S. Department of the Interior have performed several studies which have contributed to the impact determination in the EIS. These studies suggest that a 6 ft burial depth would have the least impact and reduce magnetic field signatures at the seafloor approximately four-fold. More information on potential impacts from EMF can be found in Sections 3.4.2.1 and 3.4.2.3 of the Final EIS.
The Benthic Resource Map (Figure 3.4-2) describes Area 223 as "Mid-position flats and depressions at moderate depths (144-246 feet) on fine to medium sand," but the area delineated has no depths within the stated depth range. In reviewing NOAA Chart 13237, we could find only one depth in Nantucket Sound that exceeds 100 feet (103'), and that sounding is not located in the area delineated as Area 223. Similarly, an area color-coded to represent Area 223 in the southern portion of Muskeget Channel has no depths close to the 144–246-foot range depicted. Recommended Action: EPA recommends correcting the depth range for Area 223 to reflect the actual depths in these areas.	Thank you for your comment. The data shown in Figure 3.4-2 are from the Mid-Atlantic Ocean Data Portal (MARCO). A footnote has been added to the figure to clarify that the water depths listed in the legend may not encompass the full depth range for each benthic habitat and that the MARCO data portal should be referenced for more information on specific water depths.
EPA is concerned that the Draft EIS generalizes project impacts with broad, general metrics to compare impacts across alternatives (negligible, minor, moderate or major impacts). The broad metrics often result in differing alternatives being characterized as having similar impacts when they are not. Recommended Action: The NEPA analysis would benefit from less focus on the presentation of generalized impacts (for example, table 2.4-1 on page 2-41 presents impact comparisons where generally no differences between impacts for various alternatives are indicated) and more on the clear tradeoffs between alternatives as measured by impacts. Such an approach would provide greater emphasis on the design of the alternatives that are intended to result in lowered impacts to benthic, finfish and EFH habitats. We recommend that BOEM continue to work to expand upon the discussion of the differences in impact across alternatives rather than focus on categorizing the impacts with broad metrics. These changes will benefit both the NEPA process and BOEM decision-making regarding alternatives.	Chapter 3 of the Draft EIS provided resource-specific impact level definitions for each resource section, and the impacts of each alternative align with the appropriate impact level, as supported by the analysis. Impacts to each resource area are also summarized in the EIS Executive Summary, Table ES-3. Alternatives reduced impacts on many resources; however, they did not always result in a change to the resource's impact level conclusion. The minimization of impacts is identified and quantified where possible in the Final EIS.

Comment	Response
The method used by BOEM in this Draft EIS and others for comparing alternative impacts using established ""geographic analysis areas"" (GAA) can, in many cases, limit opportunities for meaningful impact comparisons when the areas analyzed are grossly disproportionate to the project area. This can undermine the ability for the public to accurately compare anticipated project-specific impacts of the various alternatives under consideration. Recommended Action: EPA recommends that BOEM continue to work to develop more representative GAAs for making these alternative impact comparisons. This would allow the public to make a more informed and realistic assessment of impacts associated with the range of alternatives."	The Geographic Analysis Area for each resource is depicted and/or described within each associated resource section to provide context on their extent. The effects of the Project on each resource is described in each resource section.
For elements of project construction such as jet plowing to bury transmission cables and for aspects of future project operations such as potential effects of electromagnetic fields on organism behavior, significant effort was put forth in support of the Draft EIS to assess potential impacts through literature review and modeling. However, the scale and scope of the proposed activities for this and the other parallel wind development projects is unprecedented. We encourage a strong commitment by BOEM to require and provide resources for significant monitoring during construction and operation to confirm EIS assessments/predictions, to provide data needed for responsible management of operations and to guide future project assessments. We also encourage BOEM to follow the language in Section 3.6.2.3 of the Draft EIS and, "...require the applicant, as a condition of COP approval, to develop a fisheries monitoring plan for construction, operations, and decommissioning, similar to (or as an extension of) the fisheries monitoring plan implemented for Vineyard Wind 1 (Cadrin et al. 2019). Under such a plan, fisheries monitoring would be conducted before, during, and after construction in the proposed Project area and control areas to support a 'beyond before after control impact' analysis."	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).

Comment	Response
The Draft EIS (Page 2-2) describes two ESPs co-located within 500 feet of each other. Recommended Action: The Final EIS should explain how the proposed separation is consistent with the agreed upon 1 by 1 nautical mile grid intended to preserve acceptable and safe navigation and fishing opportunities. Any coordination with the USCG regarding this separation distance should also be documented in the Final EIS.	The COP notes that New England Wind will adopt the 1 x 1 NM WTG/ESP layout in accordance with the USCG's recommendations contained in the May 2020 MARIPARS. Additionally, the 1 x 1 NM grid layout is also part of the Proposed Action in the EIS. Co-located ESPs could incrementally increase navigational risks and hazards from allision and collision and complicate SAR activities and could continue to result in moderate impacts on navigation and vessel traffic. Mitigation and monitoring measures for the project are presented in Appendix H of the EIS which include those mitigation and monitoring measures that BOEM would require as a condition of COP approval.
The Draft EIS notes (page 2-35) that, "...the applicant believes it would be challenging to route even one cable within the Western Muskeget Variant." Recommended Action: Explain in more detail how the Western Variant is being considered as a feasible contingency for Phase 2.	At the time of COP submission detailed engineering of the cable routes was not complete and thus uncertainties remained as to whether all three of the Phase 2 cables could be installed within the OECC through Muskeget Channel. The Western Muskeget Variant was therefore included in the COP as a contingency measure to potentially accommodate up to two of the three Phase 2 cables. It was never considered as a feasible route for the Phase 1 cables. And, while the COP allowed for potentially two Phase 2 cables to be routed within Western Muskeget Variant to provide maximum flexibility, the applicant has noted that it would be challenging to route even one cable within the variant for multiple technical reasons. It is thus considered a contingency option for Phase 2. Given the extensive technical challenges, the applicant has always contemplated that only one cable could likely be installed within the variant.
Table 2.2-1 includes a discussion of alternatives that were considered but dismissed for detailed analysis. The discussion for Alternative 8 explains how the project is designed to avoid impacts to Atlantic cod spawning and the North Atlantic right whale. Part of the rationale for eliminating the suggested alternative is to preserve remaining lease area for the applicant to be able to pursue a future offtake agreement. Recommended Action: We recommend that BOEM make sure that concerns raised regarding Atlantic Cod and North Atlantic right whales are fully addressed before eliminating considerations for project changes to avoid impacts based on potential future projects.	Alternative 8 would have required the largest available WTGs to minimize the number of foundations constructed to meet the proposed Project capacity, minimize impacts on marine habitat and resources, and reduce navigation and other space-use concerns. It was determined that there is no scientific evidence that this alternative would not avoid or substantially lessen one or more significant environmental impacts of the proposed project and would not be economically feasible or practicable. BOEM will ensure that all issues and concerns raised regarding Atlantic COD and North Atlantic right whales are fully addressed with the preferred alternative.
EPA supports the use of bubble curtains and other mitigation measures such as soft starts (Draft EIS 3-4.18, 3.6-26 and elsewhere) or other measures to reduce noise impacts associated with pile driving.	Thank you for your comment.

Comment	Response
The Final EIS would benefit from a more robust consideration of climate change risks to the proposed action in the description of the affected environment. Recommended Action: We recommend that the discussion be expanded to include consideration of climate resiliency measures, particularly for on and offshore infrastructure (including transformer stations) that may be vulnerable to the impacts associated with climate change (such as sea level rise, more frequent storms, flooding, etc.). This discussion would provide additional details regarding the durability of the proposed infrastructure (including WTGs and buried cables at all locations) in the face of more severe weather and more severe sea states. The Final EIS should also detail steps taken by the applicant to engage with host communities regarding the siting of project infrastructure and opportunities to avoid and minimize construction and operation period impacts.	The applicant has specifically considered the implications of sea level rise, shoreline change, and future storms in the Project design. For both Project phases, only the landfall sites and immediately proximate stretches of onshore routing are within existing Federal Emergency Management Agency (FEMA) flood zones. The transition joint bays, onshore export cables, and all associated infrastructure will be designed to withstand regular water inundation. When properly installed according to industry standards, underground cable systems are not affected by flooding and weather events. Although the substation sites are well outside the flood zone, they are still designed with robust stormwater management systems to accommodate current and likely future storm conditions The presence of New England Wind infrastructure will not make the coastline or adjacent areas more vulnerable to storm damage or sea level rise. Transition joint bays will be buried within the paved parking lots at each landfall site, and the horizontal directional drilling (HDD) conduits are expected to be approximately 40-50 feet below the surface of the beach and under adjacent beach, dunes, and coastal bank, significantly decreasing the probability of exposure during a severe storm event. Within the Offshore Export Cable Corridor (OECC), the offshore export cables will be buried within the stable seabed and therefore are not expected to be exposed to hydrodynamic forces or potential interference from fishing gear or anchor strikes. A Certified Verification Agent (CVA) verification process will be used for the offshore facilities, including the wind turbine generators (WTGs), electrical service platform (ESP), inter-array cables, and export cables. The structures will be designed for the extreme environmental conditions (including wind speed and wave height) verified by the CVA. Further, extensive studies have been performed for the impacts of hurricanes and nor'easters on the offshore infrastructure, including all hurricanes since 1924 and nor'easters since 1954 as well as a synthetic hurricane study which produced a 10,000-year reconstruction of realistic storm events. Results from these studies were combined to produce the baseline for the 1,000- and 10,000-year wind and wave conditions plus storm surge for turbine foundations and the offshore substation. An additional 1 meter of sea level rise was accounted for in these water level estimates. These studies have been factored into the ongoing design of the offshore facilities.

Comment	Response
We recommend that the Final EIS provide detailed information on how frequently and at what scale cable maintenance/repair/replacement will occur, as well as the level of impacts associated with cable maintenance/repair/replacement.	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).
Figures: EPA recognizes and appreciates BOEM's efforts to include key figures in the body of the Draft EIS instead of just referencing external documents. We continue to encourage BOEM to do more in this area as figures and graphics improve the readers ability to understand the project and the potential for impacts.	Thank you for your comment.
While we understand the need to reference supporting information to meet established page limits, we recommend that BOEM could take steps to better bridge access to information referenced in the main body of the EIS and supporting documents such as the COP or Appendices to the EIS. We continue to recommend the use of hyperlinks so that a reviewer can click on the referenced information link (e.g., a COP table) and be taken directly to that table in a Draft EIS appendix. In the absence of a hyperlink, we appreciate the instances where specific source document information including page number, etc. is provided in the body of the EIS.	Thank you for your comment.
Table ES-2 there does not appear to be a footnote b as referenced. Draft EIS page 2-21 references Figure 2.1-9, which does not appear to show the OECCs for Western Muskeget variant or SCV. Figure 2.1-13 appears to provide a general depiction of the Western Muskeget Variant and SCV. Appendix A page A-3 notes that an application for an EPA NPDES permit is to be filed. Per a conversation with BOEM staff it is our understanding that a NPDES permit will not be required for the project so this reference should be removed.	The Final EIS has been updated where appropriate to address these comments.

O.4.1.3 National Oceanic and Atmospheric Administration, National Marine Fisheries Service

Table O.4-3: Responses to Comments from the National Oceanic and Atmospheric Administration, National Marine Fisheries Service

Comment	Response
We support alternatives that reduce adverse impacts to marine resources; however, the structure of Alternative C and the limited information provided to support the analysis make it challenging for us to identify the environmentally preferred cable route with respect to impacts on NOAA trust resources. Under the two sub-alternatives (C-1 and C-2), the Draft EIS identifies six possible scenarios for export cable routing for Phase 2 of the Project. This approach limits the reader's ability to understand the different impacts on resources from these six identified scenarios. We recommend BOEM consider these six identified scenarios as individual sub-alternatives under the Habitat Impact Minimization Alternative. That will allow the reader to understand how different resources are affected under each potential alternative routing scenario, and to compare the impacts of those scenarios to each other. Identification of an environmentally preferred sub-alternative is also challenged by the limited information included in the Draft EIS for each export cable routing scenario.	Section 2 of the Final EIS has been updated to include Table 2.1-2 that provides a summary of the export cable scenarios for each alternative.
The Draft EIS acknowledges that a COP revision and subsequent review by BOEM as well as supplemental NEPA analysis would be necessary prior to construction of an export cable along the SCV route. We agree that a supplemental NEPA analysis will be needed in order to fully analyze the SCV. We recommend the Draft EIS indicate what the scope of any supplemental NEPA analysis might be. For example, explain whether a supplement would evaluate a portion of the cable, the entire SCV route, or just for Phase 2 of the project, given that the SCV is only proposed for Phase 2. Additionally, we recommend BOEM evaluate the additional cable routing scenarios under the Habitat Impact Minimization Alternative included in this Draft EIS within the supplemental NEPA analysis. We suggest that the supplemental NEPA document include an analysis and comparison of all potential export cable routing scenarios with sufficient habitat data to allow for a clear and informed comparison. We recommend that the supplemental NEPA analysis for a COP revision proposing use of the SCV includes appropriate habitat data, an analysis of the full route, and comparison to other proposed routes.	If the applicant is unable to install all Phase 2 export cables in the proposed (Eastern Muskeget) OECC through Muskeget Channel, one or more Phase 2 cables could be installed in the Western Muskeget Variant. If technical, logistical, grid interconnection, or other unforeseen issues prevent all Phase 2 export cables from interconnecting at the West Barnstable Substation, the applicant would develop and use the SCV in place of or in addition to the currently proposed Phase 2 OECC and OECR (Figure 2.1-9 shows the OECCs for the Western Muskeget Variant and SCV). Because the SCV is a contingency, the applicant had not provided information on grid interconnection routes, onshore cable routes, landfall locations, and nearshore cable routes necessary to prepare a sufficient analysis of the SCV at the time of publication of this Final EIS. Therefore, the analysis of the SCV in this Final EIS includes available information but reflects some uncertainty. If the applicant determines that the SCV is necessary, the applicant would be required to file a COP revision per 30 CFR § 585.634, describing the need for the SCV and providing the information necessary to complete a sufficient analysis. In response, BOEM would complete additional environmental analysis and relevant consultations required by NEPA, NHPA, and other applicable statutes (including making the analysis available for public review and comment) to inform BOEM's decision to approve, approve with conditions, or disapprove the COP revision.
The export cable route, including passage through Muskeget Channel, overlaps with HAPC for juvenile Atlantic cod. The New England Wind lease overlaps with an area where in June 2022 the New England Fishery Management Council adopted a new HAPC for spawning Atlantic cod and complex habitats...This designation highlights the importance of this complex habitat and cod spawning habitats and creates an obligation to evaluate whether offshore wind development	"For BOEM: Recommend addressing this comment by enhancing the discussion around the juvenile cod HAPC, evidence of cod spawning activity in the lease area, and potential impacts the Project may have on these. The additional references mentioned here should also be included, along with any other new/recent data and research related to this. The trawl

Comment	Response
would adversely impact such habitats and, if so, to consider measures which would minimize that negative effect. Large-scale offshore wind development on and adjacent to areas of cod spawning activity and sensitive habitats remains a significant concern for our agency. Atlantic cod populations are in decline and significantly below target levels and the complex habitats used by this and other species are more vulnerable to long-term and permanent impacts from development. Reducing adverse impacts to these habitats will help minimize the risk of impacts on reproductive success of vulnerable cod populations, a species of biological, ecological, economic, and cultural significance to this region. We recommend BOEM evaluate measures that could be undertaken to ensure the New England Wind project avoids and minimizes impacts to these vulnerable habitats and sensitive life history stages. The Draft EIS does not analyze the full suite of potential impacts to designated HAPCs or cod spawning activity in the project area and does not consider the available data and information from studies conducted in the region . The Atlantic Cod Stock Structure Working Group identified five biological stocks in U.S. waters, which includes a Southern New England stock. The findings of this Working Group were recently published and this information should be incorporated into the analysis in the Final EIS. Recent trawl surveys have documented cod spawning activity within the lease area, though studies have not yet been conducted to identify specific aggregations overlapping with the lease area. We recommend BOEM include in the Final EIS all available information to analyze project impacts on cod spawning activity and juvenile cod HAPC and to develop appropriate avoidance and minimization measures. We recommend BOEM identify, describe, and evaluate a full range of mitigation measures in the Final EIS to protect (i.e., avoid or minimize disturbance of) cod spawning activity and juvenile cod HAPC from construction and operation of the project. We recommend the Final EIS evaluate mitigation measures, including time of year restrictions for construction activities to avoid impacting Atlantic cod spawning activity. We recommend BOEM incorporate into the Final EIS additional avoidance, minimization, and mitigation measures identified through the EFH consultation process. Given the vulnerability of the cod population, we are concerned that should this and other projects proposed in Southern New England continue to move forward absent appropriate avoidance and minimization measures, these actions will result in adverse population level effects (major adverse impacts) on the cod population in Southern New England.	surveys referenced here that have documented cod spawning activity in the lease area should also be included. Associated mitigation measures should also be included if necessary.
The Final EIS should clearly define the boundaries of each lease area for the proposed project. The Draft EIS does not clearly identify the footprint of the New England Wind Project. The maximum buildout scenario results in project structures being present in a portion of the Vineyard Wind Project 1 lease area (OCS-A 0501), which is outside of the New England Wind Project lease area. The Draft EIS does not identify when Vineyard Wind 1 will know whether it will use all of the turbine locations within lease area OCS-A 0501, which creates uncertainty about the geographic extent of the New England Wind project. The Purpose and Need statement expresses that the project must be built within the confines of the lease area. These issues should be resolved in the Final EIS.	Under the Proposed Action, the proposed Project would be developed in two phases, with a combined maximum of 130 wind turbine generator (WTG) and electrical service platform (ESP) positions, all located within the SWDA. Phase 1, also known as the Park City Wind Project, would deliver at least approximately 804 megawatts (MW) and would be immediately southwest of Vineyard Wind 1. Phase 2, also known as the Commonwealth Wind Project, would deliver at least 1,232 MW and would be constructed southwest of Phase 1 within the remainder of the SWDA. Collectively, the proposed Project would generate at least 2,036 MW and up to 2,600 MW. The Project is planning for up to 130 WTG/ESP positions with a maximum of 129 WTGs. 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 Park City Wind for the New England Wind

Comment	Response
	Project if those positions are not developed as part of the Vineyard Wind 1 Project.
Van Hoeck, R., Rowell, T.J., Dean, M. J., Rice, A., Van Parijs, S.M. (In Press) Comparing Atlantic cod temporal spawning dynamics across a biogeographic boundary: insights from passive acoustic monitoring. Marine and Coastal Fisheries. https://www.fisheries.noaa.gov/new-england-mid-atlantic/science-data/analyzing-cod-populations-atlantic McBride R. S., R. K. Smedbol, (Editors). 2022. An Interdisciplinary Review of Atlantic Cod (Gadus morhua) Stock Structure in the Western North Atlantic Ocean. NOAA Technical Memorandum NMFS-NE-273. Woods Hole, Massachusetts: US Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center. i-x, 264 pp. https://repository.library.noaa.gov/view/noaa/48082 Van Parijs, S., Dean, M., McGuire, C., Cadrin, S., and Frey, A. 2022, July 26-28. Preconstruction evaluation of Atlantic cod spawning in Southern New England offshore wind areas [Conference presentation]. NYSERDA State of the Science Workshop, Tarrytown, NY, United States.	Thank you for your comment.
The Draft EIS proposes to use a 1x1 nautical mile (nm) grid position, yet the proposed plan would co-locate two electric service platforms (ESPs) within 500 feet of each other. This configuration would not allow the 1x1 nm grid spacing for foundations mutually agreed upon by all developers to maintain a standard spacing across all RI/MA wind projects. Configurations that do not allow for the 1x1 nm grid space could result in adverse impacts to fishing operations, as it would increase navigation safety concerns and reduce fishing and survey vessel access around such positions. We recommend BOEM adopt the mitigation measure identified in Section 3.13 that would prohibit the co-location of two ESPs in one single position.	The COP notes that New England Wind will adopt the 1 x 1 NM WTG/ESP layout in accordance with the USCG's recommendations contained in the May 2020 MARIPARS. Additionally, the 1 x 1 NM grid layout is also part of the Proposed Action in the EIS. Co-located ESPs could incrementally increase navigational risks and hazards from allision and collision and complicate SAR activities, and could continue to result in moderate impacts on navigation and vessel traffic. Mitigation and monitoring measures for the project are presented in Appendix H of the EIS which include those mitigation and monitoring measures that BOEM would require as a condition of COP approval.
Support for Conclusions - We recommend BOEM thoroughly review the rationale for each impact level conclusion to ensure conclusions are fully supported by the text and the best available information. Impact determination should be consistent with the definition of the impact conclusion.	Chapter 3 of the Draft EIS provided resource-specific impact level definitions for each resource section, and the impacts of each alternative align with the appropriate impact level, as supported by the analysis. Impacts to each resource area are also summarized in the EIS Executive Summary, Table ES-3. Alternatives reduced impacts on many resources; however, they did not always result in a change to the resource's impact level conclusion. The minimization of impacts is identified and quantified where possible in the Final EIS.
Mitigation Measures - The Draft EIS contains sections where BOEM is relying on mitigation measures to reduce impacts, but does not specify which of these measures, if any, are factored into the impact determination. In addition, assumptions about the success of mitigation measures are made despite a lack of evidence or adequate detail regarding specific mitigation measures (e.g., fisheries and resource survey impact mitigation). We recommend the Final EIS address the anticipated impacts of the proposed action, mitigation measures that are considered to be part of that action, the effectiveness of these measures, the expected impacts if mitigation methods are applied, and the likelihood that such measures will be required and implemented. We ask that BOEM clarify if additional measures may be implemented upon COP approval but were not factored into the impact analysis.	"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.

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Significance Criteria - The significance criteria for some resources, in combination with the defined area of analysis for each resource, do not fully consider variations in the intensity or scale of impacts and how these factors may affect resources at the project, regional, or population levels. The importance of the seasonal timing or temporal duration of impacts to resources is not clearly explained through the significance criteria or applied to the analysis. Consideration of both the scale and intensity of impacts in the definition and application of the significance criteria would allow for accurate impact conclusions and provide clear distinctions among action alternatives.	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)."
Geographic Analysis Area - The Draft EIS does not appear to capture the effects of the project on resources within the Southern New England region. The Final EIS should analyze project impacts within the bounds of an appropriate geographic scale to allow for a meaningful understanding of effects to each resource from IPFs of the project. A geographic analysis area that is too broad may not predict the direct and indirect effects of the proposed action on a finer scale defined by the IPF.	The Geographic Analysis Area for each resource is depicted and/or described within each associated resource section to provide context on their extent. The effects of the Project on each resource is described in each resource section.
Cumulative Analysis - The cumulative analysis in the Draft EIS by section is very general, and does not provide a meaningful analysis of how this project, in combination with adjacent projects, will impact the resources in Southern New England. While the cumulative analysis includes areas beyond Southern New England, the effects to this specific region from large-scale development are not analyzed in the document, a gap which should be addressed in each offshore wind project's EIS.	Appendix E of the Draft EIS stated that 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]). This appendix discussed 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).
NOAA Scientific Surveys: We continue to have significant concerns related to the major impacts offshore wind development will have on our NOAA scientific surveys. The Draft EIS does not include any discussion on how these major impacts will be mitigated at the project level other than referencing the ongoing BOEM/NMFS survey mitigation efforts. However, the mitigation strategy is not currently resourced and does not set requirements or standards with which projects must comply. In order to minimize the major adverse impacts expected on scientific surveys, we recommend mitigation measures be required and implemented before	BOEM has committed to working with NOAA to implement the Federal Survey Mitigation Strategy program (https://repository.library.noaa.gov/view/noaa/47925). As of February 2023, implementation is pending. As discussions between BOEM and NOAA on implementation of the program continue, specific details on appropriate mitigation measures will be added to the environmental analysis.

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development moves forward, consistent with our joint survey mitigation efforts. We will continue to work with you to ensure these details can be included in the Final EIS.	
The comparison of the Habitat Impact Minimization Alternative sub-alternatives focuses solely on the amount of acreage impacted and provides limited comparison of the different habitat types and resources encountered under each scenario. Levels of impact will vary depending on habitat type, as complex habitats, including juvenile cod Habitat Areas of Particular Concern (HAPC), are more vulnerable to long-term and permanent impacts. The variation in habitat impacts is not analyzed, as the Draft EIS does not clearly present available habitat data or analyze how impacts among these cable routes would vary based on habitats present within the proposed scenarios identified...We note that we responded to a January 20, 2023, data request from Epsilon Associates which includes information for both cable routes; we recommend this information be included in the Final EIS.	Section 2 of the Final EIS has been updated to include Table 2.1-2 that provides a summary of the export cable scenarios for each alternative.
There are no habitat data or landing location available for the South Coast Variant (SCV) cable. We recommend BOEM include this information in the Final EIS to allow for a full analysis and comparison of the different effects of these cable routes, as three of the six scenarios identified consider the SCV cable route. 3 The location where development is proposed is a critical component of the analysis of impacts to NOAA trust resources; a Project's effects may vary depending on the resources present. In addition to variations in habitat types, impacts to fishing operations will also vary depending on the location proposed for the export cable route, but the Draft EIS does not analyze impacts to fishing operations from cable installation and operation, particularly for the SCV.	The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.
There continue to be important analyses and conclusions that are absent from the Draft EIS. Certain impact producing factors (IPFs) are missing, such as Resource Monitoring Surveys (fisheries surveys and benthic monitoring) and unexploded ordnance (UXO) removal and relocation. Updated fishery impact data/analysis should also be included, along with an analysis of impacts to shoreside support and fishing communities. All anticipated IPFs should be fully analyzed for all resources and for both project phases.	All anticipated IPFs were fully reviewed and presented in the Draft EIS. An Economic exposure analysis for commercial fisheries is provided in COP Vol. III-N.
Incomplete Analysis of Both Project Phases - Because New England Wind has been proposed as a single phased project, we recommend that BOEM comprehensively analyze activities associated with both Phase 1 and Phase 2 in this Final EIS. This is particularly important when considering the effects of activities that will be different between the two phases, such as pile driving noise (Phase 2 considers larger diameter piles), different foundation types (Phase 2 considers using suction bucket foundations), and different cable routes. While the Draft EIS describes the activities that will be carried out in association with Phase 2, the resource sections of Chapter 3 that consider the effects of Phase 2 are extremely limited, with the document simply suggesting that impacts will be similar to Phase 1 but "marginally larger." If Phase 2 is being considered in the Final EIS as part of the proposed action for which BOEM has a decision on whether to approve, disapprove, or modify the COP, we recommend that the Final EIS fully describe and analyze the effects of all Phase 2 activities.	Phase 1 and Phase 2 of the Project are discussed in each resource section of Chapter 3. Where they exist, the differences between the Phases are called out and differing impacts are discussed. Overall, activities associated with Phase 1 and Phase 2 are similar in nature and addressed accordingly in the Final EIS. BOEM will further review the resource sections of Chapter 3 to make sure the activities and associated impacts of Phase 1 and 2 are discussed appropriately.
Document Inconsistencies - The level of analysis by project area and resources is inconsistent throughout the document. Some sections have more thorough evaluations but those analyses do	The Final EIS has been comprehensively reviewed and revised where appropriate to provide consistency between analyses and conclusions. The

Comment	Response
not always align with the impact conclusion (or an impact conclusion is missing). Other sections are much more limited in the analysis of potential project impacts. We recommend BOEM analyze the effects of each IPF for each project phase and development stage (i.e., construction, operation, and decommissioning) with equal rigor and draw a separate impact conclusion for the stressors associated with each activity; then explain how the impacts of all stressors are factored to draw an overall impact conclusion for a specific resource.	level of analysis in the Final EIS is sufficient to fulfill the purpose of NEPA: to enable a reasoned choice among alternatives.
The Final EIS should also incorporate the applicant's updated project information (e.g., construction schedule, fishery monitoring surveys and mitigation), marine mammal density, and exposure estimates as presented in their MMPA application addendum to prevent inconsistencies between the Final EIS and MMPA proposed rule.	The Final EIS has been updated to account for the new construction schedule and mitigation and monitoring measures.
Cumulative Effects of Alternative A (No Action) - All anticipated IPFs should be fully analyzed for all resources. There are varying levels of concluding statements for each IPF under the cumulative effects of Alternative A (No Action) across the resource sections. Without a clear concluding statement (including minor, moderate, or major; beneficial or adverse) for the impacts of each individual IPF, it is difficult for the reader to fully understand the makeup of the overall impact conclusion for the cumulative effects of the No Action alternative.	The Final EIS has been comprehensively reviewed and revised where appropriate to provide consistency between analyses and conclusions. The level of analysis in the Final EIS is sufficient to fulfill the purpose of NEPA: to enable a reasoned choice among alternatives. All anticipated IPFs were fully reviewed and presented in the Draft EIS.
The level of analysis across the different project stages for each IPF is also inconsistent. The construction phase is thoroughly described, but the operations and maintenance and decommissioning stage descriptions are lacking. We recommend BOEM add a sub-heading for each stage under each IPF so it is clear which stage is being discussed.	The Final EIS has been comprehensively reviewed and revised where appropriate to provide consistency between analyses and conclusions. The level of analysis in the Final EIS is sufficient to fulfill the purpose of NEPA: to enable a reasoned choice among alternatives.
This comment may show up under specific resources, but is applicable across all resources. The analysis of the Phase 2 portion of the project is incomplete and missing relevant details. While under some resources there is discussion of the actual project parameters of Phase 2 and ensuing impacts, it is generally incomplete. This section should be revised for the FEIS to clearly address all effects and IPFs of Phase 2 of the project on the respective resources. Simply stating that the impacts will essentially be the same as Phase 1 but marginally larger is not an analysis of project effects. We recommend that BOEM comprehensively analyze activities associated with Phase 2 in the FEIS. If Phase 2 is being considered in the EIS as part of the proposed action for which BOEM has a decision on whether to approve, disapprove, or modify the COP, we recommend that the EIS fully describe and analyze the effects of all Phase 2 activities. This is particularly important when considering the effects of activities that will be different between the two phases, such as pile driving noise (Phase 2 considers larger diameter piles), different foundation types (Phase 2 considers using suction bucket anchoring), and different cable routes.	Phase 1 and Phase 2 of the Project are discussed in each resource section of Chapter 3. Where they exist, the differences between the Phases are called out and differing impacts are discussed. Overall, activities associated with Phase 1 and Phase 2 are similar in nature and addressed accordingly in the Final EIS. BOEM will further review the resource sections of Chapter 3 to make sure the activities and associated impacts of Phases 1 and 2 are discussed appropriately.
To ensure full public access, please ensure that all tables, graphs, and figures are 508 compliant. That requires Alt Text titles and descriptions that can be captured by auto readers, table structured so they can be read by auto reader (no subheadings/columns/rows or split cells). Tables with colored cells should include the color and meaning in the Alt Text descriptions.	BOEM has and will continue to ensure that all tables, graphs, and figures are 508 compliant.
Please change the following to previously agreed upon language and to also accurately reflect the status of the ITA application received by NMFS: "In addition, the NMFS received a request for authorization (in the form of a Letter of Authorization) under the Marine Mammal Protection Act (MMPA) to take marine mammals incidental to construction activities related to the Project.	The suggested edit has been made in the Final EIS.

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NMFS' issuance of an MMPA incidental take authorization would be a major Federal action connected to BOEM's action (40 CFR 1501.9(e)(1)). The purpose of the NMFS action—which is a direct outcome of Park City Wind's request for authorization to take marine mammals incidental to specified activities associated with the Project (e.g., pile driving)—is to evaluate Park City Wind's request pursuant to specific requirements of the MMPA and its implementing regulations administered by NMFS, considering impacts of the applicant's activities on relevant resources, and if appropriate, issue the permit or authorization. NMFS needs to render a decision regarding the request for authorization due to NMFS' responsibilities under the MMPA (16 U.S.C. 1371(a)(5)(A) & (D)) and its implementing regulations. If NMFS makes the findings necessary to issue the requested authorization, NMFS intends to adopt, after independent review, BOEM's environmental impact statement (EIS) to support that decision and fulfill its NEPA requirements."	
This only discusses public involvement relative to scoping. It should include all available information regarding the public comment meetings, dates of deadlines, methods of collecting comments, etc.	Information regarding the public comment meetings has been added to the Final EIS.
WSR - Weather Surveillance Radar." Change to: "WSR-88D Weather Surveillance Radar - 1988 Doppler"	The suggested edit has been made in the Final EIS.
Please change the following to previously agreed upon language and to also accurately reflect the status of the ITA application received by NMFS: "In addition, the NMFS received a request for authorization (in the form of a Letter of Authorization) under the Marine Mammal Protection Act (MMPA) to take marine mammals incidental to construction activities related to the Project. NMFS' issuance of an MMPA incidental take authorization would be a major Federal action connected to BOEM's action (40 CFR 1501.9(e)(1)). The purpose of the NMFS action—which is a direct outcome of Park City Wind's request for authorization to take marine mammals incidental to specified activities associated with the Project (e.g., pile driving)—is to evaluate Park City Wind's request pursuant to specific requirements of the MMPA and its implementing regulations administered by NMFS, considering impacts of the applicant's activities on relevant resources, and if appropriate, issue the permit or authorization. NMFS needs to render a decision regarding the request for authorization due to NMFS' responsibilities under the MMPA (16 U.S.C. 1371(a)(5)(A) & (D)) and its implementing regulations. If NMFS makes the findings necessary to issue the requested authorization, NMFS intends to adopt, after independent review, BOEM's environmental impact statement (EIS) to support that decision and fulfill its NEPA requirements."	The suggested edit has been made in the Final EIS.
Materials that are incorporated by reference need to be summarized in the text (40 CFR 1501.12) – "Agencies shall cite the incorporated material in the document and briefly describe its content." NMFS recommends adding the abstract of these documents here.	The suggested edit has been made in the Final EIS.
Please include a short explanation at the end of the paragraph about whether the list of activities in Appendix E has been developed for this specific project, or whether this same list of activities was developed for and is being included for all OWS projects in the Atlantic, regardless of project location, scale, or details. Please see related comment in Appendix E. This issue has also been identified by NMFS in CVOW, Ocean, Empire, Mayflower, and Sunrise.	The suggested clarifying text has been added to Final EIS Section 1.6.

Comment	Response
Please add "Environmental Consequences Section" to the first sentence so that it reads: "Each resource-specific Environmental Consequences section in Chapter 3 of this..."	The suggested edit has been made in the Final EIS.
Under Alternative B, the proposal to use one position to co-locate two ESPs within 250 feet of each other would likely violate the 1 nm x 1 nm agreement for turbine spacing among RI/MA wind projects and would increase safety concerns for navigation and search and rescue and reduce fishery access around such positions. We recommend BOEM disapprove this measure to minimize adverse impacts to safety and access.	The COP notes that New England Wind will adopt the 1 x 1 NM WTG/ESP layout in accordance with the USCG's recommendations contained in the May 2020 MARIPARS. Additionally, the 1 x 1 NM grid layout is also part of the Proposed Action in the EIS. Co-located ESPs could incrementally increase navigational risks and hazards from allision and collision and complicate SAR activities and could continue to result in moderate impacts on navigation and vessel traffic. Mitigation and monitoring measures for the project are presented in Appendix H of the EIS which include those mitigation and monitoring measures that BOEM would require as a condition of COP approval.
DEIS Table 2.1-1, Alternative B (proposed action): "Up to 132 total foundations for 125 to 129 WTGs and 1 to 5 ESPs would be installed in 130 positions"; footnote: "incorporate 132 foundations in 130 WTG/ESP positions." The table contradicts its footnote and the document elsewhere, including the Executive Summary, that states: "Up to 130 WTGs" & pg. 1-5: "Under the Proposed Action, the proposed Project would be developed in two phases, with a combined maximum of 130 wind turbine generator (WTG)." Were 130 WTGs or 129 WTGs analyzed? The DEIS FR Notice also states 129 WTGs. Please clarify and check for consistency of WTG numbers.	The EIS states throughout the document that there will be a maximum of 130 positions that will be used for WTGs AND ESPs, with a maximum of 129 WTGs.
Please clarify when it will be known whether Vineyard Wind 1 will utilize all of the turbine locations in Lease Area 0501 and if such locations will be incorporated into the proposed project. The uncertainty of the footprint makes it difficult for the reader to fully understand the impacts for this project.	Under the Proposed Action, the proposed Project would be developed in two phases, with a combined maximum of 130 wind turbine generator (WTG) and electrical service platform (ESP) positions, all located within the SWDA. Phase 1, also known as the Park City Wind Project, would deliver at least approximately 804 megawatts (MW) and would be immediately southwest of Vineyard Wind 1. Phase 2, also known as the Commonwealth Wind Project, would deliver at least 1,232 MW and would be constructed southwest of Phase 1 within the remainder of the SWDA. Collectively, the proposed Project would generate at least 2,036 MW and up to 2,600 MW. The Project is planning for up to 130 WTG/ESP positions with a maximum of 129 WTGs. 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 Park City Wind for the New England Wind Project if those positions are not developed as part of the Vineyard Wind 1 Project.
The rationale provided for the considered but dismissed alternative (Table 2.2-1: Alternatives Considered but Not Analyzed in Detail, Alternative #8) that would exclude WTG positions does not consider the most up-to-date scientific evidence and includes inaccurate statements regarding the habitat requirements for Atlantic cod spawning. We recommend this be updated for the FEIS. While the VW/SMAST trawl survey summary reports do not include spawning conditions, the data is being collected and was recently presented at the NYSERDA SOS workshop (Van Parijs, S., Dean, M., McGuire, C., Cadrin, S., and Frey, A. 2022, July 26-28.	The suggested references (NYSERDA conference presentation an Van Hoek et al. (in press)) could not be located and have not been included. If NMFS has these references readily available and is able to share, BOEM could include these references. The Fahay et al. references have been corrected, and Alternative #8's Rationale for Dismissal has been updated to elaborate on the fact that complex benthic habitat is not a requirement for spawning Atlantic Cod.

Comment	Response
Preconstruction evaluation of Atlantic cod spawning in Southern New England offshore wind areas [Conference presentation]. NYSERDA State of the Science Workshop, Tarrytown, NY, United States). This data indicates that spawning condition cod were captured both within and adjacent to the NE Wind lease area during the Vineyard Wind/NE Wind (Avangrid Renewables) pre-construction fisheries surveys completed with SMAST. The presence of ripe and ripe & running cod in the trawl indicates that spawning occurs within the immediate vicinity of captured spawning condition cod; however, surveys to detect the location of spawning aggregations have not yet been conducted in this area. Van Hoek et al. (in press) have identified that spawning activity in the vicinity of Cox Ledge begins in November with active spawning occurring during daylight hours when pile driving would be expected to occur, and note that a time of year restriction is the most successful measure available to minimize pile driving impacts on spawning aggregations even with other mitigative measures available, including bubble curtains. This analysis should be incorporated into the FEIS. Additionally, the provided references appear to be incorrect, misinterpret information contained within them, and/or are based on outdated information. For example, the Fahay et al. (1999) citation is for a different species (bluefish), and the correct citation - Fahay et al. (1999) "Atlantic Cod, Gadus morhua, Life History and Habitat Characteristics" - does not include the information that is cited in the rationale. Fahay et al. (1999) formed the basis of original EFH text description for Atlantic cod that stated: "Spawning Adults: Bottom habitats with a substrate of smooth sand, rocks, pebbles, or gravel in the Gulf of Maine, Georges Bank, southern New England, and the Mid-Atlantic south to Delaware Bay as depicted on the map below. Generally, the following conditions exist where spawning cod adults are found: Water temperatures below 10° C, depths from 10 - 150 meters, and a wide range of oceanic salinities. Cod are most often observed spawning during fall, winter, and early spring." The recently updated EFH text descriptions merged the spawning life history stage text description into the adult EFH text descriptions. The updated adult cod EFH text description states: "Adults: Sub-tidal benthic habitats in the Gulf of Maine, south of Cape Cod, and on Georges Bank, between 30 and 160 meters (see Map 41), including high salinity zones in the bays and estuaries listed in Table 19. Structurally complex hard bottom habitats composed of gravel, cobble, and boulder substrates with and without emergent epifauna and macroalgae are essential habitats for adult cod. Adult cod are also found on sandy substrates and frequent deeper slopes of ledges along shore. South of Cape Cod, spawning occurs in nearshore areas and on the continental shelf, usually in depths less than 70 meters." The information presented, which suggests complex habitat is required for cod spawning, is inaccurate and should be modified in the FEIS. While recent studies have noted that complex habitats adjacent to spawning aggregation areas may be used during periods of rest, there has been no linkage to a requirement for complex habitats and such a requirement was not included in the EFH text descriptions or the recently proposed HAPC for cod spawning in SNE. We do not recommend citing a prior EIS generated for another project (BOEM VW FEIS), as supporting rationale for dismissing this alternative, as new information related to the occurrence of cod spawning activities within and adjacent to the lease area have since become available (e.g. Van Parijs et al. 2022, and Van Hoek et al. (in press)). Information related to spawning activity in the lease area was not known at the time of the VW1 project review. We recommend any reference, or reliance on such information be removed from the provided	Alternative 8 would have required the largest available WTGs to minimize the number of foundations constructed to meet the proposed Project capacity, minimize impacts on marine habitat and resources, and reduce navigation and other space-use concerns. It was determined that there is no scientific evidence that this alternative would not avoid or substantially lessen one or more significant environmental impacts of the proposed project and would not be economically feasible or practicable. BOEM will ensure that all issues and concerns raised regarding Atlantic Cod and North Atlantic right whales are fully addressed with the preferred alternative.

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rationale. We also recommend BOEM reconsider the basis for rejecting this alternative using the most-up-to-date and accurate information.	
Resource monitoring surveys/gear utilization and UXOs (noise and habitat impacts) are missing from the list of IPFs. Resource monitoring surveys may be included in the Anchoring and Gear Utilization IPF per the table but it should be split out as its own IPF.	The suggested edits have been made to Section 3, Table 3.1-1 in Final EIS.
After the end of the 3rd sentence ("in the preferred alternative"), please add language along the lines of: "If any mitigation measures are analyzed in the impact analyses and those measures influence the impact determinations, those measures will be included in the preferred alternative." Any mitigation and monitoring terms that influence the impact conclusions and final agency decision need to be committed measures in order for the assumptions and conclusions of the analysis to be accurate. They are not optional measures. This comment has been made previously in other EISs.	The suggested text has been added to Final EIS Section 3.2.
The Geographical Analysis Area was selected to include a 10-mile radius around the SWDA and the OECC. This section states that these buffers will account for benthic invertebrate larval transport, however, recent studies suggest that several larval invertebrate species present in this area can be transported for much further than 10 miles. For example, surfclams can drift 119 km along shore (1.5-10km inshore/offshore) (Zhang et al., 2015), while scallops can travel 100s of km (Tian et al., 2019) and lobsters can travel up to 280 km (Incze and Naimie, 2000). As such, a much larger larval distribution buffer (and thus a larger GAA) is needed for this section that takes into consideration the best available science and information for species present in this area. Additionally, the DEIS should clarify if this 10-mile radius is used to evaluate the cumulative analysis or impacts to benthic resources from the proposed action itself.	While some species have certain life stages that may have a larger range than 10 miles, as discussed in Final EIS Section 3.4.2.3, the vast majority of the Project's impacts to benthic resources would occur and be detectable within a 10-mile radius of the Project footprint. Therefore, a Geographical Analysis Area of 10 miles for benthic resources is adequate for evaluating the projects impacts to benthic resources. The following clarifying text has been added to Final EIS Section 3.4.1: "Some species have ranges that extend beyond the GAA at certain life stages such as larval invertebrates (Zhang et al. 2015 and Incze and Naimie 2020); however, this analysis focuses on impacts within the Geographic Analysis Area." Clarifying language was also added to Final EIS Appendix D.
A map and associated information is provided for the benthic resources and habitat types within the GAA, SWDA, and OECC for Phase I. However, this information is not provided for Phase 2 which includes the SCV route. Because the SCV is included in several of the sub-alternatives, any available information on benthic habitat types in this area, including potential landing area and corridors in state waters, should be identified for a complete impacts analysis.	The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.
Under the Accidental Releases portion of the Cumulative Impacts, the DEIS mentions that "best management practices (BMPs) for waste management and mitigation of marine debris would be required and would reduce this risk." Please elaborate or provide information/references to these BMPs or provide specific mitigation measures that would be implemented.	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. Text has been added which refers to Table H-2 in Appendix H. Similar mitigation measures, such as those detailed in Appendix H will be followed by each planned offshore wind project.
Please provide a reference for the following information in the Accidental Releases section, "In the event of an accidental release (e.g., small fuel spill), the contaminant could be transported,	The most recent source has been included and the text revised.

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adhere to particulates in the water column, and eventually sink to the seafloor, possibly resulting in elevated sediment hydrocarbon concentrations but not likely at levels that would affect benthic communities. In most cases, the corresponding impacts on benthic resources within the geographic analysis area are unlikely to be detectable unless there is a catastrophic spill from ongoing activities (e.g., an accident involving a tanker ship)."	
Presence of Structures - The final paragraph under this IPF suggests that offshore wind development could result in the regulatory exclusion of some currently fished areas from future fishing, and that the impacts of fishing would not occur in those areas under that scenario. While fishing may need to halt in certain areas during the construction phase and certain gears may have a more difficult time operating within wind farms, there are no current fishery management actions that would exclude fishing within wind farms via fishing regulations. Additionally, this paragraph does not differentiate the impacts of fishing (a temporary alteration of the seafloor) from the impacts of offshore wind (permanent conversion of the seafloor). There may be physical impacts from fishing, but offshore wind has physical, electromagnetic, noise, and vibratory impacts, among others. The scale, duration, and diversity of the impacts are different for the two activities and they are not interchangeable. Any fishery regulations would be directed at reducing fishing mortality on affected species and will analyzed through separate NEPA documents if and when such actions are developed by state or regional fishery management bodies. Please consider removing the last two sentences of this paragraph.	The suggested edit has been made in the Final EIS.
Accidental Releases - The DEIS should evaluate the potential for the Proposed Action to facilitate the establishment and range expansion of non-native species. This should include a discussion of the stepping stone effect. Please review and incorporate relevant literature. Statements made should be supported by scientific evidence.	The text on invasive species was expanded with references added.
This section states that "little is known about the potential impacts of EMF on benthic resources, although the available information suggests that field strengths expected from Phase 1 would be below levels shown to cause impacts." However, field strength levels expected from Phase 1 are not explicitly provided. A previous paper is referenced in a previous section that presumably presents these field strength levels, however, we recommend providing the EMF field strength levels anticipated from Phase 1 (as well as Phase 2) within the FEIS in order to be clear and transparent of anticipated impacts. Please review and incorporate the current literature into the discussion of potential impacts of EMF on benthic resources. Statements made should be supported by scientific evidence.	Project-specific EMF levels were included as well as supporting literature from recent studies.
Please provide a reference for the following statement: "The seafloor would be disturbed by cable trenches, skid tracks, and spud prints. Although active construction would temporarily disturb benthic habitat, non-complex habitats would rapidly return to pre-Project conditions following impacts from burial."	Citations and text referring to benthic recovery have been added.
Noise – Please provide a more in-depth discussion of the potential noise impacts on benthic resources including substrate vibration and support statements with scientific evidence. Impacts of noise should also be analyzed for all phases of development including Pile Driving, G&G, O&M, Cable Laying/Trenching, and Decommissioning.	Noise is addressed at the same level of detail provided within the COP and is supported by recent literature. Additional text and citation were added.

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This section states that the applicant is considering the use of a bubble curtain for far-field noise mitigation. Please confirm/clarify whether or not the applicant will utilize this mitigation measure during construction. Currently, a description of the mitigation measure is provided, but it is uncertain whether this technique will actually be used and therefore cannot be fully considered when evaluating mitigation measures for this IPF. It is unclear if BOEM is considering this mitigation measure as part of the proposed action when making the impact level determination.	The applicant will implement noise attenuation mitigation technologies to reduce sound levels by an approximate target of 12 decibels or greater. Bubble curtains is one potential noise attenuation technology that could be implemented. Applicant-proposed mitigation measures are discussed in Final EIS Appendix H, Table H-1.
Presence of Structures – Please include an analysis of both local and broad scale hydrodynamic (i.e., wind wakes) effects, the potential for the establishment and range expansion of non-native species, habitat conversion, artificial reef effect, and the modification of the prey field and diet for upper level predators. Please also include relevant supporting literature to support statements made. There is a growing body of knowledge on these topics and the majority of this information is missing from the analysis.	The analysis of impacts from presence of structures on benthic resources includes hydrodynamic effects, the potential for establishment and range expansion of non-native species, habitat conversion, and artificial reefs. Additional text has been added to Final EIS Section 3.4.2.3 regarding diet modification for upper level predators. Supporting literature is also included in this section.
The analysis of the Phase 2 portion of the project in this section is incomplete and missing relevant details. This is inconsistent with how Phase 2 is treated in other sections where there is some discussion of the actual project parameters of Phase 2 and ensuing impacts. This section should be revised for the FEIS to clearly address all IPFs and effects from Phase 2 of the project on benthic resources. Simply stating that the impacts will essentially be the same as Phase 1 but marginally larger is not an analysis of project effects. We recommend that BOEM comprehensively analyze activities associated with Phase 2 in the FEIS. If Phase 2 is being considered in the EIS as part of the proposed action for which BOEM has a decision on whether to approve, disapprove, or modify the COP, we recommend that the FEIS fully describe and analyze the effects of all Phase 2 activities. This is particularly important when considering the effects of activities that will be different between the two phases, such as pile driving noise (Phase 2 considers larger diameter piles), different foundation types (Phase 2 considers using suction bucket anchoring), and different cable routes.	Phase 1 and Phase 2 of the Project are discussed in each resource section of Chapter 3. Where they exist, the differences between the Phases are called out and differing impacts are discussed. Overall, activities associated with Phase 1 and Phase 2 are similar in nature and addressed accordingly in the Final EIS. BOEM will further review the resource sections of Chapter 3 to make sure the activities and associated impacts of Phase 1 and 2 are discussed appropriately.
Please provide a complete analysis of benthic resources and potential IPFs for Alternative C. Simply stating that the cumulative impacts of both Alternative C-1 and C-2 would be similar to those of Alternative B does not allow the reader to understand how impacts to benthic resources may differ from the proposed action. Different areas, habitats, and species would be impacted through Alternative C and thus must be evaluated individually. Additionally, there is currently not enough information provided to support the determination of "negligible to moderate and moderate beneficial" impacts for this alternative, as components of the alternative under consideration remain unknown.	Phase 2 offshore export cable scenarios are provided in Final EIS Table 2.1-2 and the scenarios corresponding to each Alternatives are addressed in Table 2.1-1. A description of how each Alternative impacts benthic habitat is addressed in Final EIS Section 3.4.2.4.
Please ensure that impacts determinations are provided for each IPF under each alternative and that these determinations accurately reflect the information presented in your analysis as there are some discrepancies and inconsistencies throughout this section. Some examples include: Page 3.4-7 under Accidental Releases which states, "the overall impacts of accidental releases on benthic resources are likely to be localized and short term, resulting in undetectable changes to benthic communities." However, in the analysis above you state that impacts from "establishment of a [released] invasive species on benthic resources could be strongly adverse, widespread, and permanent." These two statements, as well as other information within the	Impact determinations for the Proposed Action are provided under each IPF, and have been reviewed. The discussion about accidental release for example is evaluating the small potential of accidental release in the No Action Alternative, so not project specific impacts. Each of the planned wind farm projects, through the BOEM permitting process, will have to follow noise mitigation measures. Similar mitigation measures, such as those detailed in Appendix H will be followed by each planned offshore wind project.

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analysis, are inconsistent. Additionally, on page 3.4-11 under Noise, it states that "noise transmitted through water and/or through the seabed is assumed to have the potential to cause injury and/or mortality to benthic resources..." and may cause "...behavioral changes [that] could affect the same populations or individuals multiple times in a year or in sequential years." However, you do not provide a clear impact determination for this IPF. Clear and accurate impacts determinations for each IPF based on a thorough analysis and the best available science are needed in order for NMFS to provide a complete review of impacts to trust resources and to properly evaluate alternatives. Please be sure to adhere to the criteria and guidance presented in Table 3.4-1: Impact Level Definitions for Benthic Resources when assigning impact determinations.	
Please ensure descriptions of proposed mitigation measures are provided if they are to be considered in overall impacts determinations. For example, on page 3.4-15 under Anchoring and Gear Utilization, it states "BOEM assumes that survey procedures would have sufficient mitigation procedures in place to reduce potential impacts including, but not limited to, avoidance of sensitive benthic habitats." However, no description or reference to these mitigation procedures is provided.	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. See Final EIS Appendix H, Table H-2, Measure 10 for more information.
There is limited information on benthic resources among the sub-alternatives considered. This is particularly true for the proposed SCV export cable which does not include a complete route or landing location. The incomplete analysis of the different cable routes under consideration make it difficult to understand and compare impacts of the alternative cable routes on benthic resources.	Final EIS Section 3.4.2.4 discusses the potential impacts to benthic resources from Alternative C-1 and C-2. Additional information on potential Phase 2 offshore export cable scenarios are provided in Final EIS Table 2.1-2. The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.
The GAA described in 3.5.1.2 and depicted in Figure 3.5-1 does not include areas impacted by the SCV. "Geological zones for the OECC" does not include the OECC for the SCV. Please update this information and these figures to reflect all potential landfall sites, coastal habitats, and fauna potentially impacted by each alternative in each phase of the Project.	The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is

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	chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.
This section should include a discussion on impacts of potential invasive species releases.	The accidental release of invasive is discussed in Final EIS Section 2.6.2.1 and Section 3.6.2.3.
The impact determination for this section is based off of the assumption that methods would avoid the need for dredging. However, previously in this section you mention that "if sufficient burial is not achieved on the first installation pass, the applicant would make subsequent attempts, possibly using other installation techniques to achieve sufficient burial. In certain cases, alternative installation methods may be needed." We recommend that the impact determination reflect the potential for these alternative installation methods and provide a range of potential impact levels accordingly.	As noted in Final EIS Section 2.1.2.2, as part of the PDE, several cable installation methods could be used for the inter-array cables, inter-link cables, and offshore export cables. The applicant would typically use post-lay burial techniques for cables, which involve laying cable sections on the seafloor using a jet plow or jet trenching (or possibly a mechanical plow) to bury the cables. Other burial methods could be more rarely used, although the choice of installation method would depend on seafloor conditions and sediment characteristics (COP Volume I, Section 3.3.1.3). The ocean-to-land transition at each landfall site would employ HDD technologies to avoid or minimize impacts to the beach, intertidal zone, and nearshore areas.
This text states that "BOEM could require as a condition of COP approval, that the applicant restrict its dredging and cable installation methods and timing, as described in Appendix H, potentially in combination with additional habitat characterization." We support the use of time of year restrictions to avoid and minimize impacts to resources; however, it is unclear if BOEM plans to require time of year restrictions, and for what resources, or if it is considered in BOEM's impact level determination. Please clarify.	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. See Final EIS Appendix H, Table H-2, Measure 10 for more information.
Please provide a source or reference for the conclusions/determinations made in this section.	The sources and references for this section have been included in the appropriate locations throughout Final EIS Section 3.5.2.3.
We appreciate that some level of analysis is provided for Phase 2 in this section and acknowledge that BOEM states they will provide a more detailed analysis of the impacts of the SCV and the Phase 2 OECC and OECR in a supplemental NEPA analysis. The DEIS currently does not provide an evaluation of impacts to coastal habitats and fauna for Phase 2 because the information presented in this section does not fully consider all aspects of the alternatives is presented.	Final EIS Section 3.5.2.3 discusses Phase 2 impacts from the Proposed Project on coastal habitats and fauna. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3.
Please provide a description or a map of SSU habitats within the proposed Project area (including SCV and associated corridors/landfall sites). Avoidance of such habitats is mentioned throughout this section, however, no identification of the locations of these habitats within the Project area is provided. This information should be present within the EIS and not just referenced in the COP.	The proposed Project's cable corridor survey data were compared to existing data to assess the potential for SSU habitats in the immediate vicinity of the OECC. The proposed OECC and historically mapped sensitive areas provided by Massachusetts are shown in COP Volume II, Appendix A. The areas of habitats within 328 feet of the offshore export cable centerline are provided in Final EIS Section 3.5.1.2, Table 3.5-1.
This section does not fully describe and highlight the importance of the varying characteristics and habitats within the Project area that my impact specific fin fish and invertebrates. Analyses	Section 3.6.1 of the EIS provides a description of the different habitats located within the GAA that are necessary for the impact determinations. It

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overall are brief and would benefit from consideration of all relevant project details. Clear and robust definitions of the lease area and identification of different Project region habitats are necessary to meaningfully and accurately distinguish and evaluate impacts among the alternatives under consideration. We recommend providing a thorough characterization of the Project area, including a more refined description of the diverse benthic habitat be incorporated into the alternatives analysis in the FEIS. Additionally, we recommend that available figures (i.e. backscatter, boulder locations) be included to provide a clear distinction between the variation in habitat types and resources present in the Project area that could impact finfish, invertebrates, and EFH. This distinction should then be considered in the analysis of project impacts and comparison of alternatives.	is not intended or necessary for an encyclopedic description of all habitat. For additional description of habitats, please refer to the COP. Chapter 2 provides a detailed description of each alternative analyzed and therefore, it is not needed within each resource section. For additional discussion and details on the various benthic habitats please refer to Section 3.04, Benthic Resources. In addition, the level of habitat characterization and impact analysis is commensurate with other BOEM wind Farm Final EISs.
The analyses in this section lack substantive evaluation of impacts likely to occur to Atlantic cod spawning activity. The evaluation and analysis of project activities should be revised to include an evaluation and analysis of all activities that could disrupt spawning activity and should be based on the best available information (see comments and references identified in our letter and under Chapter Two PDF page 78-79 in the comment table). Particular emphasis should be placed on activities that will result in benthic disturbance or generate noise as such activities may disrupt aggregations or mask vocalizations. Further, spawning cod exhibit strong site-fidelity to spawning grounds. The potential for abandonment of the spawning grounds within the lease area due to the extensive modification of habitats under the proposed action should be acknowledged and included in the analysis. We recommend the FEIS evaluate additional mitigation measures, including time of year restrictions for construction activities to avoid impacting Atlantic cod spawning activity. In addition, a more robust analysis of project impacts to all life stages of species of Atlantic cod (e.g., egg and larvae) that overlap with the project area is recommended. This includes acknowledgment of the amount and location of Project area overlap with Atlantic cod HAPC. It is stated that Phase 1 could affect HAPC for juvenile Atlantic cod, but the total amount of HAPC is unknown. This information is necessary to evaluate impacts to these habitats. Please provide a more robust analysis of potential juvenile Atlantic cod HAPC impacted for both Phase 1 and Phase 2, including the extent of HAPC to be impacted.	A discussion regarding potential impacts to Atlantic Cod spawning activity is included in Section 3.6.2.1 of the EIS including noise and bottom disturbing activities.
The EIS should identify all Habitat Areas of Particular Concern (HAPC) overlapping with the project and evaluate whether construction, operation, and decommissioning of the New England Wind project would adversely impact such habitats and, if so, consider measures which would minimize that negative effect. The project overlaps with HAPC for summer flounder, and juvenile cod, and the recently approved HAPC for spawning cod and complex habitats. The NEFMC approved an HAPC that is focused on protecting two elements - 1) complex habitats; and 2) cod spawning activity - from the anthropogenic pressure and development in Southern New England, specifically offshore wind development. To be considered for an HAPC designation, the 2002 EFH regulations (50 CFR Part 600.815(a)(8)(i)-(iv)) requires one or more of the following four criteria to be met: 1) importance of historic or current ecological function for managed species; 2) sensitivity to anthropogenic stresses; 3) extent of current or future development stresses; and/or 4) rarity of the habitat type. As described in detail in the NEFMC's Draft Submission to us dated August 22, 2022, the Council's approved HAPC meets all four of	Section 3.6.1.3 of the EIS includes a discussion of the HAPCs along with the overlapping acres within the project footprint and their location within the project area and the potential impacts are discussed in the detailed IPF discussions where applicable in Section 3.6.2.3.

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these criteria for the designation of an HAPC for Atlantic cod spawning activity and three of the criteria for the designation of an HAPC for complex habitat. The Council's approved HAPC applies to any area where cod spawning activity is identified (based upon specified criteria) regardless of the habitat type where spawning occurs. This is particularly important to clarify as cod spawn over a variety of habitat types and use different habitat types within aggregation areas. These HAPCs should be accurately described and impacts evaluated in the EIS.	
Section 3.6.1.3 EFH states that HAPCs for summer flounder occur within the OECC. However, section 3.6.2.3 (Cable Emplacement) states that Phase 1 would not affect beds or loose aggregations of eelgrass EFH HAPC for juvenile and adult summer flounder because Phase 1 would avoid eelgrass aggregations. Please provide a more information on eelgrass in the project area, including distance of eelgrass from proposed activities, and measures proposed to avoid eelgrass habitats. It should also be noted that HAPC for summer flounder also includes macroalgae, but it unclear if the project will avoid these areas well. It is unclear if or how summer flounder HAPC, including eelgrass beds, would be affected by Phase 2 of the project. The FEIS should clearly describe impacts to submerged aquatic vegetation (SAV) from Phase 1 and 2 and describe how impacts to these habitat will be avoided. If impacts are anticipated, mitigation plans should also be described.	While eelgrass has been identified near the landfall locations, at this time, no impacts to eelgrass are expected during the course of project development. Locations where eelgrass has been identified is provided in Section 3.4.1.1 in the Final EIS. Potential impacts to eelgrass are detailed in the Project-specific EFH Assessment, including requirements for additional surveys prior to construction and potential minimization and mitigation measures should eelgrass be identified.
The Geographic Analysis Area does not match the scale of project activities. The analysis area provided spans the entire southern New England sub-region of the Northeast U.S. Continental Shelf Large Marine Ecosystem (LME), which extends from the southern edge of the Scotian Shelf (in the Gulf of Maine) to Cape Hatteras, North Carolina. However, the project area is a much smaller subset of this area. The large size of the analysis area may dilute the effects of the project specific impacts to finfish and EFH, especially when making conclusions such as "The affected area for gravel or hard bottom would be less than 0.1 percent of the total area of that type of sediment." We recommend providing a more reasonable GAA that allows for a more meaningful evaluation of the impact producing factors (IPFs) of the proposed action and alternatives.	The Geographic Analysis Area for each resource is depicted and/or described within each associated resource section to provide context on their extent. The effects of the Project on each resource is described in each resource section.
The Vineyard Wind 1 biological assessment (BOEM 2019c) is not a NOAA document and thus should not be attributed as such. The bullet point about ESA-listed species occurrence should list all ESA-listed species by name and should be specific to the proposed action, encompassing the area/waters where all project activities will occur. Additionally, it states that four species occur, however, five species are listed on page 3.6-5.	The EIS has been changed to clarify that the Vineyard Wind 1 BA is a BOEM document. ESA listed and candidate species are listed in the Vineyard Wind 1 BA. Four species are presented in the Section 3.6.1.
Distinct population segments (DPS) is not the appropriate term to describe species that occur in New England/MAB; "region" should be used instead. Ensure that the entire action area is being considered for listed species occurrence, inclusive of all vessel routes. Additionally, this section should list the DPSs of listed species that may occur in the action area. This pertinent to Atlantic sturgeon (all) and Atlantic salmon (Gulf of Maine DPS). The DEIS should contain a summary of the findings in the BA. If the BA will not be included as an appendix to the final document, we encourage BOEM to make the BA publicly available on the New England Wind webpage (not just on the ESA consultation page) so that the information can be easily referenced by the public.	The EIS has been changed based on recommendations. The BA has been referenced and will be publicly available once it has been finalized.

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Shortnose sturgeon and Atlantic salmon (if vessel transit routes include the Gulf of Maine) are missing from the list of species that may be affected. Resource monitoring surveys are missing from IPFs listed under all the Alternatives. Impact determinations should be made for all listed species that may occur in the action area and for all IPFs, not just for two species under one IPF (giant manta ray and oceanic whitetip shark - Noise). Additionally, include citations to support the assertions about impacts. The use of BOEM 2022d is not a clear reference to support the statement that all IPFs and impacts on finfish and EFH apply to listed species as it is the BA to support ESA consultation and does not consider effects to finfish that are not listed under the ESA or EFH. We suggest including a clarifying sentence how BOEM 2022d is a relevant reference.	The EIS has been updated to address these two ESA species.
The analysis of the Phase 2 portion of the project in this section is incomplete and missing relevant details. This is inconsistent with how Phase 2 is treated in other sections where there is some discussion of the actual project parameters of Phase 2 and ensuing impacts. This section should be revised for the FEIS to clearly address all effects and IPFs of Phase 2 of the project on benthic resources. Simply stating that the impacts will essentially be the same as Phase 1 but marginally larger is not an analysis of project effects. We recommend that BOEM comprehensively analyze activities associated with Phase 2 in the FEIS. If Phase 2 is being considered in the EIS as part of the proposed action for which BOEM has a decision on whether to approve, disapprove, or modify the COP, we recommend that the EIS fully describe and analyze the effects of all Phase 2 activities. This is particularly important when considering the effects of activities that will be different between the two phases, such as pile driving noise (Phase 2 considers larger diameter piles), different foundation types (Phase 2 considers using suction bucket anchoring), and different cable routes. Specific to the discussion of the South Coast Variant (SCV) route, it is stated that the SCV will disturb up to 329 acres of seafloor and that the impacts of SCV construction on finfish, invertebrates, and EFH would be similar to those for the Phase 2 OECC. The impacts would range from negligible to moderate and would be highest if EFH cannot be avoided. If it is unclear how the disturbed acreage and potential impacts of the SCV are calculated if the route is not finalized at this time and it is in a different location than the other potential cable routes. It is important to note that the SCV may transit through Buzzard's Bay, which will impact an estuary, and associated estuarine resources. Additionally, EFH is designated along the entire range of the export cable routes considered for both Phase 1 and Phase 2 so impacts to EFH cannot be avoided. The DEIS does not present enough information to support the conclusion stated in the document related to impacts to EFH from Phase 2 of the project.	Phase 1 and Phase 2 of the Project are discussed in each resource section of Chapter 3. Where they exist, the differences between the Phases are called out and differing impacts are discussed. Overall, activities associated with Phase 1 and Phase 2 are similar in nature and addressed accordingly in the Final EIS. The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.
Shortnose sturgeon and Atlantic salmon (if vessel transit routes include the Gulf of Maine) are missing from the list of species that may be affected. Additionally, there is no analysis of the proposed action effects to listed fish species, the DEIS only presents unsupported conclusory statements. These statements also do not cover all relevant IPFs nor take into consideration any mitigation and monitoring measures. It is also unclear why a table summarizing ESA effects determinations for listed marine mammals is presented in this section about finfish, perhaps an error? Additionally, many IPFs (UXOs, resource monitoring surveys, benthic/habitat disturbance, etc.) are missing from the table. The DEIS should contain a summary of all the	The EIS has been updated to address these two ESA species.

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relevant findings/IPFs in the BA. We suggest that additional context be provided to explain how the ESA effects determinations correspond with NEPA impact levels laid out at the beginning of the resource section.	
Accidental Releases – This section should evaluate the potential for the Proposed Action to facilitate the establishment and range expansion of non-native species. This should include a discussion of the stepping stone effect. Please review and incorporate relevant literature. Statements made should be supported by scientific evidence.	The EIS has been updated to discuss the potential for nonnative species and the stepping stone effect.
Please provide more support to the conclusion that the permanently altered seabed profile would result in a minor level of impact to finfish, invertebrates, and EFH.	The EIS has been added to additional support.
EMF – This section should include a more in depth analysis of EMF particularly as it relates to EMF sensitive species in the region. This should include potential effects on movement patterns and migration. The body of knowledge on this topic is continuing to grow to include additional species and life stages. This information should be included (e.g., Cresci et al. 2022, https://doi.org/10.1093/pnasnexus/pgac175; Harsanyi et al. 2022, https://doi.org/10.3390/jmse10050564	A discussion of EMF and the potential effect on fish and invertebrates is included in Section 3.6.2.1 of the EIS. Additional discussion regarding EMF has been added.
There is some discussion in this section about the impacts of noise on eggs, embryo, and larvae, but no specific discussion of the impact of noise on cod spawning even though the OECC and lease area will overlap with juvenile cod HAPC and HAPC recently approved by the NEFMC for cod spawning.	Noise impacts associated with the Project's WTG operation and vessel noise was found to be minor. Noise associated with the Project and its potential impact on fish, invertebrates, and EFH are addressed in Final EIS Section 3.6.2.3.
Noise – This section should include discussion on the potential for noise to mask communication and the resulting effects on feeding and reproduction; There should also be some analysis of particle motion as well as effects of substrate vibration on early life stages. Relevant literature includes, e.g., de Jong et al. 2020, doi.org/10.1007/s11160-020-09598-9; Siddagangaiah et al. 2021, doi: 10.1002/rse2.231; Stanley et al. 2020, doi.org/10.1242/jeb.219683; Sigray et al. 2022, doi.org/10.1016/j.marpolbul.2022.113734; Sole et al. 2022, doi.org/10.1016/j.envpol.2022.119853; Hawkins 2022 https://doi.org/10.1121/10.0013994	A discussion regarding particle motion has been added to Section 3.6.2.3 of the Final EIS.
Noise/Operational Phase – Regarding this sentence: "That compilation found that the combined noise levels from multiple turbines is lower or comparable to that generated by a small cargo ship (Tougaard et al. 2020)." Please describe how the turbine size at the New England Wind project compares to those in Tougaard et al. 2020. Turbine size will affect the amount of noise emitted during operation.	As stated in Section 3.6.2.3 of the EIS, Tougaard et al. 2020 includes that the turbine size affects the noise emitted and looked at a variety of wind farms internationally with different turbine sizes and included 0.2 MW to 6.15 MW turbine sizes in the modeling and analysis.
Presence of Structures/Non-native species – This section should evaluate the potential for the Proposed Action to facilitate the establishment and range expansion of non-native species. This should include a discussion of the stepping stone effect. Please review and incorporate relevant literature. Statements made should be supported by scientific evidence.	Additional text was added to Final EIS Section 3.6.2.3 regarding invasive species and stepping-stone effect.
Presence of Structures/Hydrodynamics – It should be noted that NMFS has suggested that the Johnson et al. 2021 report undergo an open and transparent peer review process. Currently, this report has not undergone peer-review.	Additional text has been added to Final EIS Section 3.6.2.3 to provide more clarity.

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Presence of Structures/Hydrodynamics – This discussion should include a discussion on potential effects on thermohaline stratification and potential impacts to primary and secondary production (See Daewel et al. https://doi.org/10.21203/rs.3.rs1720162/v1 and the potential scale of wind wake effects (10's of km from the wind farm).	Discussion about the results from hydrodynamic models has been added to Section 3.6.2.3 of the Final EIS, including Daewel et al. 2022 and similar studies. Text has also been added to briefly address the differences between the modeled North Sea turbines, and the aquatic setting of the Proposed Action.
Presence of Structures – In regards to this sentence: "The potential impacts of wind energy facilities on offshore ecosystem functioning have been studied using simulations calibrated with field observations (Raoux et al. 2017; Pezy et al. 2018; Wang et al. 2019)" -- Only Wang et al. 2019 reported post-construction patterns. No wind farms have been built yet in the study area of the other two papers cited so there has been no "field calibration." Also, note that Wang et al. 2019 concluded that there would be both adverse and beneficial effects on the ecosystem. If using this citation in the analysis, then both beneficial and adverse effects should be presented.	References have been corrected and additional text has been added to discuss the potential beneficial and adverse effects from the presence of structures.
NMFS has released the draft 2022 SARs. Please update the FEIS with the new NARW information in tables and in text (e.g., annual M/SI rate on page 3.7-8). Also update the FEIS closer to publishing with all UME numbers.	Final EIS Section 3.7 has been updated with the most recent SAR.
NMFS has released the draft 2022 SARs. Please update the FEIS with the new NARW information in tables and in text (e.g., annual M/SI rate on page 3.7-8). Also update the FEIS closer to publishing with all UME numbers.	Final EIS Section 3.7 has been updated with the most recent SAR.
NMFS appreciates this table as it makes our action very clear. However, Park City Wind has requested a small amount of take for a number of rare species that are not included here. Our proposed rule isn't out yet but we ask the species included in Table ES-3 of Park City Wind's application be included in this EIS table. For these rare species, including blue whales, NMFS suggests identifying how that the impact of the IPFs on these species is expected to be similar for other marine mammals of their group (e.g., mysticetes, odontocetes, pinnipeds).	Final EIS Section 3.7.1 has been updated to indicate that rare species with take assessed in the MMPA LOA application are considered relative to their group (i.e., mysticetes, odontocetes, pinnipeds). Additionally, all species (including rare) have been added to Table 3.7-1. However, these species have not been added to Table 3.7-3 since this table is only focused on commonly occurring species within the OECC and SWDA.
The No Action Conclusions section makes impact determinations on the baseline conditions of marine mammals. However, it is missing an impact determination on not approving the COP (i.e., the incremental impact of taking No Action). NMFS advises adding a paragraph along the lines of the following: "Under the No Action Alternative, BOEM would not approve Park City Wind's COP. Hence, stressors from construction, operation, and maintenance of the New England Wind Project would not occur. Baseline conditions of the existing environment would remain unchanged. Hence, not approving the COP would have no additional incremental effect on marine mammals. Similarly, NMFS No Action alternative (i.e., not issuing the requested incidental take authorization) would also have no additional incremental impact on marine mammals and their habitat."	The EIS has been updated in the No Action Alternative introduction section to address this comment, which has been additionally edited for clarity.
Ongoing offshore wind activities within the geographic analysis area should also include the site assessment (G&G surveys, fisheries surveys) activities that are ongoing.	Ongoing site assessment and site characterization surveys (e.g., geotechnical and geophysical surveys, habitat monitoring surveys, fisheries monitoring surveys) have been added to the list of ongoing offshore wind activities.
Please cite/provide a source used for background information of sound.	The EIS has been updated to include primary sources for background information on sound.

Comment	Response
Vibratory Pile Driving - Please include more detail to support the conclusion that vibratory pile driving is not expected to be long lasting or biologically significant to marine mammal populations.	The EIS has been updated to provide more supportive information for that impact determination
The Summary of Noise section omits UXOs. In addition, NMFS encourages that mitigation measures be required that would avoid the potential for mortality and non-auditory injury that is identified as a potential impact on page 3.7-28.	Section 3.7.2.1 of the EIS discussed UXOs. Additionally, mitigation will be specific to the project so UXO mitigation is only discussed in detail for the Proposed Action in Section 3.7.2.3, but the overall discussion of UXO in Section 3.7.2.1 has been updated
Please provide an updated sources for vessel strikes and mortalities of the North Atlantic right whale. The same statistic is used again on page 3.7-50 (228) and should be updated.	Final EIS Section 3.7.2.3 the text and data related to NARW mortality resulting from vessel strike has been edited and updated.
Conclusions - A more thorough explanation is needed to support the conclusion. It is unclear when/how the IPF stressors would be removed under the No Action alternative, as it describes impacts from current regional trends. If this statement is only in regard to the completion of current offshore wind projects, it needs to be stated. A similar edit should be made with the conclusion specific to the North Atlantic right whale at the end of the paragraph.	Conclusions for the Impacts of Alternative A and the Cumulative Impacts of Alternative A have been updated for clarity and specificity, including impacts for NARWs.
Please provide more detail on any additional impacts caused by dredging.	The EIS analysis of dredging impacts has been expanded.
The statement "With noise mitigation and the additional proposed mitigation and monitoring measures, it is not expected any marine mammal would experience permanent impacts from pile driving such as PTS" is not accurate. Park City has demonstrated the potential for PTS from impact pile driving does exist and has requested take accordingly.	The EIS has been revised to indicate that, even with mitigation measures implemented, exposures leading to PTS is still possible
The statement "Vibratory setting and drilling would, therefore, result in minor impacts on marine mammals" appears to be made in consideration of the duration of the time these activities would occur. The analysis omits the potential results of exposure (e.g., ceasing foraging, decreased communication, masking, etc.) and the large spatial distances at which these behaviors may occur. NMFS suggests BOEM include a behavioral component in their analysis to further support (or alter) their impact finding.	The potential for behavioral disturbances was considered in the EIS; however, though the ranges to the behavioral disturbances are large, the overall duration of the exposure would be limited to a few hours a days for a portion of the total number of piles proposed during construction. Because of the limited duration of these activities relative to the full construction period, no prolonged changes in behavior are expected for any species. The text has been updated to address this.
The top of this page indicates that impacts are moderate for all mysticetes because the lower frequency of sound [emitted by vessels] overlaps with the most sensitive hearing range. However, in the pile driving section (a much louder sound sources also in low frequency ranges) the impact from pile driving is minor for NARWs (which is a mysticete). It is difficult to reconcile that noise from vessels has more of an impact than noise from pile driving.	The impact determinations for vessel noise have been updated to be minor for all marine mammals as no population level effects are expected, and pile driving would pose a greater acoustic risk for marine mammals
The EIS states "While the significance level of impacts would remain the same, BOEM could further reduce impacts on marine mammals by requiring as a condition of COP approval...." and "the use of noise-reduction technology....would reduce the area impacted..." It is unclear why BOEM is indicating that use of noise attenuation device would further reduce impacts when the use of such device is already considered in the analysis above (i.e., there is no analysis/impact conclusion for pile driving without use of noise attenuation system). It is also unclear why BOEM indicates that impact levels would still be the same regardless of impact mitigation and monitoring measures were prescribed. For example, the potential for mortality from UXO detonation certainly increases without any mitigation and monitoring as does more severe	The statement "While the significance level of impacts would remain the same, BOEM could further reduce impacts on marine mammals by requiring as a condition of COP approval...." has been removed as you are correct, all these mitigation measures were included in the assessment and contributed to the final impact determinations.

Comment	Response
impacts from pile driving (particularly for NARWs). NMFS recommends that if BOEM is not committing to include any mitigation at this time, the EIS include an analysis for each IPF with and without such mitigation for each IPF.	
The "minor" conclusion for vessel strikes during Phase 1 appears to be incongruous with the analysis initially presented in Alternative A and in the "traffic" section of Alternative B. Both sections identified vessel strikes with regards to NARW are likely during OSW activities. If the proposed measures are going to reduce the likelihood of vessel strikes please indicate to what level they will be reduced (0, negligible, etc.). If vessel strikes are unlikely (please further describe) due to the measures put in place, please explain why. Similar analysis can be found in other OSW EISs currently under development.	The analysis for vessel strike has been updated as follows: "With implementation of known and highly effective measures such as reduced vessel speeds and ships maintaining minimum distances from marine mammals, this impact is considered negligible for pinnipeds and odontocetes, as impacts would be barely detectable, and minor for non-listed mysticetes because impacts would be detectable but not lead to population-level consequences. As the death of a single NARW could lead to population-level consequences and the application of mitigation cannot rule out the potential for this to occur, this impact is considered major for NARW and moderate for all other listed mysticetes, whose populations would be expected to sufficiently recover."
The DEIS states that the effects of the presence of structures of Phase 2 will be the same as Phase 1. It is not fully described as to why/how that is the case. More detail should be provided in this section, as even though the number of foundations to be added under Phase 2 are close to that of Phase 1, the DEIS does not discuss that Phase 1 structures will also exist in the area where Phase 2 structures will be added. This will greatly increase the space occupied by structures, and will collectively increase most impacts such as migratory movements, altered fishing practices, and potential oceanographic effects. While this clarification might be more appropriate in a different section, it should be included under this resource.	The analysis for Phase 2 Presence of Structures IPF has been re-assessed and edited accordingly.
In regards to the table summarizing ESA effects determinations for listed marine mammals, many IPFs (UXOs, resource monitoring surveys, benthic/habitat disturbance, etc.) are missing from the table. The FEIS should contain a summary of all the relevant findings/IPFs in the BA. We suggest that additional context be provided to explain how the ESA effects determinations correspond with NEPA impact levels laid out at the beginning of the resource section. If the BA will not be included as an appendix to the final document, we encourage BOEM to make the BA publicly available on the New England Wind webpage (not just on the ESA consultation page) so that the information can be easily referenced by the public.	This table and accompanying text has been removed from the EIS as, without the accompanying analysis from the BA, is not necessary or justified in inclusion within this EIS.
The "minor beneficial impacts on marine mammals" is not in line with the conclusions in the earlier sections or in the impact determination tables.	Minor beneficial impacts had been reviewed in earlier sections for marine mammals (only applicable to the reef effect due to the presence of structures IPF). Language on beneficial impacts throughout has been edited and verified.
Please modify the "Conclusions" section for "Impact of Alternative B" with regards to referencing BOEM's BA. Currently this section reads as though the BA was written by and conclusions approved by NMFS. The BA is only a representation of BOEM's initial assessment and does not necessary reflect the determinations of other agencies (NMFS). Please modify the references to this document to only read "BOEM's BA" and "from the Bureau of Ocean Energy Management's Biological Assessment" (Table 3.7-12).	This table and accompanying text has been removed from the EIS as, without the accompanying analysis from the BA, is not necessary or justified in inclusion within this EIS.

Comment	Response
Please describe how a decreased disturbance of complex habitat lessens associated impacts from cable emplacement and maintenance, noise, and presence of structures to marine mammals.	The analysis of Alternatives C-1 and C-2 have been updated and edited accordingly.
Mitigation and monitoring measures are only briefly referenced with no analysis of their effectiveness. Additionally, measures that are mentioned in-text and in Appendix H are very sparse. Given the reliance on mitigation measures as part of the analysis, the lack of details regarding the actual measures, how they will be implemented, and their effectiveness is problematic and does not allow for a complete analysis. This should be addressed in the FEIS.	Additional text about the specific mitigation measures that would be implemented under the Proposed Action for applicable IPFs in Section 3.8.2.3 has been added with discussion of how this contributed to the impact determinations.
Overall, the analyses of each IPF would benefit from a more well-reasoned and organized analysis to understand the various impacts of the proposed project over the three phases (construction, O&M, and decommissioning). As part of this analysis, seasonality of the impacts and sea turtle biology should be taken into consideration, along with applicable mitigation and monitoring measures.	The discussion of the IPFs in Section 3.8.2.3, where appropriate, has been updated to include more information about differences between the three phases (if any) and sea turtle presence/biology that would affect the impact determination.
NMFS biological opinions should not be cited to support impacts of the proposed action. Primary sources should be cited and independent analyses should be conducted.	The analysis of impacts for all alternatives assessed have been updated to cite primarily sources instead of referring to NMFS BOs.
The FEIS should contain a summary of the findings in the BA, not just state that a certain impact was analyzed in the BA. If the BA will not be included as an appendix to the final document, we encourage BOEM to make the BA publicly available on the New England Wind webpage (not just on the ESA consultation page) so that the information can be easily referenced by the public.	All references to the BA impact analysis with no accompanying discussion have been removed.
References should be reviewed throughout this section to ensure they are up to date and reflect the best available information. Summaries of sea turtle status are available in the most recent recovery plans and 5-year reviews prepared by NMFS and USFWS and should be referenced here. This should be revised in the FEIS.	All references have been checked/updated with more recent ones where applicable, and all the most recent recovery plans and 5-year status reviews for sea turtle species have been reviewed/incorporated.
Throughout the sea turtle section, the text references back to the marine mammal section for much of the noise impact analysis and also other information. This information should be included in the sea turtle section and be specific to sea turtles, not a general comparison to marine mammals.	The references back to the marine mammal section are specific to the description of the acoustic modeling which is done to meet the BOEM page limit and reduce repetition in the EIS; any discussion points essential to the impact determinations for sea turtles are included in Section 3.8 of the EIS.
It would be helpful to include which sources were used for each density presented in the table. These densities do not match those used in previous draft BAs for nearby lease areas. Please review the South Fork Wind Biological Opinion, Revolution Wind BA, Empire Wind BA, and Sunrise Wind BA (and our relevant comments) and ensure there is consistency among sources and sea turtle density estimates.	The sea turtle densities were obtained from the COP modeling report which is cited in the footnote of Table 3.8-2, and the sources used for the densities based on the information provided in the COP are described in the text preceding the table.
Ongoing offshore wind activities within the geographic analysis area should also include the site assessment (G&G surveys, buoy deployments, fisheries surveys) activities that are ongoing.	This has been included in the list of ongoing activities in Section 3.8.2.1 of the EIS.
Please expand on the claim that accidental releases may impact sea turtles due to their impacts on prey species. Provide examples of the type of accidental release, the prey species, and the specific impact it would have on sea turtles.	The EIS has been updated with additional text to expand on this claim about sea turtle prey species and potential effects of accidental releases.
Please expand on the impacts that would occur if multiple projects occur in close proximity. Provide details as to how this would affect sea turtles and how they would not be biologically significant.	The EIS has been updated with additional text to discuss the potential effects of cable emplacement projects in close proximity and why BOEM determined this would not pose a biologically significant risk to sea turtles.

Comment	Response
Statement concludes that events will limit "marine mammals potentially present during construction." Please update as this section discusses sea turtles.	The EIS has been updated for sea turtles and all erroneous references to marine mammals have been removed.
Please add a more recent statistic for percentage of strandings of loggerhead sea turtles with evidence of vessel strike. Adding an additional number will show a full time series from 1980, to 2004, to near present which helps illustrate the point and gives an accurate representation of the current trend.	More recent statistics for sea turtle strandings with evidence of vessel strikes has been added in Section 3.8.2.1 of the EIS.
NMFS 2022b is cited in a sentence about oil spill modeling, however, NMFS 2022b in Appendix K is listed twice, once as the 2017–2022 Minke Whale Unusual Mortality Event along the Atlantic Coast webpage and also the Endangered Species Act Section 7 Consultation Biological Opinion: Construction, Operation, Maintenance, and Decommissioning of the New England Wind Offshore Energy Project (Lease OCS-A 0534). Please revise references accordingly as neither of these appear to be a relevant citations.	References have been revised accordingly.
The text states that accidental releases would not increase the risk than what was described in Alternative A, though this is likely true given the large scope of Alternative A, the analysis of Alternative B should focus on the proposed action and provide an accurate analysis of the project impacts.	The impact determination for Section 3.8.2.3 is based on just the Proposed Action and text has been updated to clarify this point.
Please clarify if ropeless gear will be used for all trap/pot fisheries surveys. A brief description of the survey activities, type of gear, number of tows/sets/trawls...etc. should be included. There is no related mitigation measure in Appendix H that mentions ropeless gear. Additionally, please provide citations that short tow times pose a negligible threat to sea turtles that may be captured by trawl gear. Lastly, suggest splitting out Marine Resource Surveys as their own IPF and not including it with Anchoring.	Yes ropeless gear will be considered as part of the mitigation and the text has been updated to include that as an option. The text has also been updated to provide additional information about the proposed surveys and clarification for the short tow times has been added. Lastly, BOEM has reviewed this and found that no restructuring to add additional IPFs is not required.
Specify the type of dredge that will be used for cable installation activities and if any seafloor preparation will be needed (sand wave leveling). Dredging, in particular suction/hopper dredging, can result in the impingement and/or entrainment of sea turtles. An analysis of the impacts to sea turtle species with respect to dredging activities is missing and should be described. Additionally, provide justification that sea turtles would be able to successfully forage in other areas not affected by cable laying activities.	The EIS has been updated to describe that dredging may be accomplished through the use of a TSHD or through jetting by controlled flow excavation, and dredging of sand waves along portions of the OECC may occur under Alternative B; however, it would be limited to only the extent required to achieve the desired cable burial depth. Additional text regarding potential effects on sea turtles due to dredging has been included.
Operations and maintenance phase should also be included in the Climate Change section as there will be GHG emissions from vessel traffic and other associated activities. Turbines also contain SF6 which can leak.	The operations phase has been included in the climate change IPF.
Please clarify in the EMF section if in areas where cable cannot be buried and cable protection is required if EMF levels will be higher.	It is not anticipated that EMF would be higher as the cables will still be partially buried and the presence of the cable protection would act as a buffer for potential EMF levels. This has been updated in Section 3.8.2.3.
Please clarify that impacts from vessel lighting during decommissioning would be the same as project operations rather than project construction. If kept, please provide additional details.	Additional text has been added to this section to clarify the distinction between the lighting produced during construction, operations, and decommissioning.
In the Lighting section, short-term impacts during construction should also be analyzed, not just long-term. This is especially relevant as construction (and ensuing lighting) will likely occur in the months when sea turtle density is highest in the area.	The EIS has been updated to clearly distinguish the risk of effects from construction, decommissioning, and operations and assess each accordingly.

Comment	Response
Please include a table with acoustic thresholds used for exposure modeling with citations.	The thresholds are provided in Table B-43 in Appendix B with the citations.
Clarify if the statement "incorporation of the mitigation is provided in Section 3.7" is referring to the noise mitigation system.	Yes, this statement was referring to the noise mitigation system. This sentence has been adjusted to provide more clarity.
Clarify in-text that the exposure ranges in Tables 3.8-6 and 3.8-7 are for impact pile driving. Please also include a table with the number of sea turtles exposed, not just the PTS and behavioral distances. Additionally, clarify if nighttime pile driving is proposed.	The exposure ranges in the tables are for impact pile driving and, the table headers have been clarified. In addition, sea turtle exposures are provided in Section B.5 of Appendix B. Nighttime pile driving will be avoided to the extent feasible, but the Proposed Action does anticipate that some of the piles may require nighttime pile driving in which case a nighttime pile driving plan will be developed to outline the additional measures put in place to help protect sea turtles. Additional text has been added to the pile driving discussion to address this.
The text states that sea turtles will swim away from the ensonified area, given this the FEIS should discuss the risk that sea turtles may incur from swimming away and into areas with potentially higher fishing effort and/or vessel traffic. Additionally, sea turtles eliciting a behavioral response may have increased surface intervals and be at greater risk of ship strike, this should be addressed. Also, please include supporting information that sea turtles will indeed swim away, what are the consequences if they do not?	The discussion of behavioral effects on sea turtles due to impact pile driving has been updated in Section 3.8.2.3 of the EIS.
Additional information from the COP should be included in the EIS to support the impacts of vibratory and drilling piles. The current text is very sparse. This should include an explanation of the different methods and when they will be used, including the potential exposure to sea turtles.	Additionally information from the COP has been added to support this discussion.
The assessment of UXO impacts on sea turtles is incomplete. Exposure modeling should be completed to estimate the impacts of UXO detonations on sea turtle species. Please provide additional details with respect to the pre-survey clearance monitoring measures that will be implemented prior to UXO detonation/blasting. Specifically, explain how the MEC/UXO clearance zones will be monitored for the presence for sea turtles prior to UXO detonations.	Exposure modeling is not available for sea turtles in the COP so the Final EIS assessment uses the best available information to describe the potential effects. Ultimately, BOEM erred on the side of caution which is what resulted in the moderate impact determination when other Final EIS (e.g., OCW1) had minor determinations for UXO for sea turtles. In addition, the Project's BA discusses UXO exposure modeling on sea turtles based on the modeling results from the Revolution Wind Project. This is now mentioned in Final EIS Section 3.8.2.1.
The text above states a minimum of 10 dB attenuation will be achieved for impact pile driving and UXO detonation but the text here states that only a 6dB attenuation will be achieved, please clarify.	The EIS has been updated to indicate that a minimum of 10 dB noise attenuation is included under the Proposed Action.
The Operational Noise section is very sparse with no project specific information about the types of turbine drive trains that are proposed to be used. Please consider reviewing past EISs and revising this section. Additional information and citations are needed in the FEIS to support the assertion that operational noise of wind turbines would not reach levels that could result in behavioral effects to sea turtles.	A full description of the type of WTG technology that is being considered is provided in Volume I of the COP. BOEM has reviewed previous EIS and the information provided is consistent, to the extent practicable, with those EISs, and additional supportive literature has been added to enhance the discussion.
The Presence of Structures section should contain a site-specific analysis of the proposed action, not refer the reader back to Alternative A as that is not an accurate representation of the proposed action. Additionally, the impact of the resource monitoring surveys are previously	The EIS has been updated accordingly to address this comment.

Comment	Response
considered in the Anchoring section above and should not be repeated here. The analysis of the impact of increased fishing effort around turbine structures is lacking references and essentially dismisses the potential for any impact without any analysis. Turbine structures have been shown to draw recreational fishing effort which has the potential to increase the risk of incidentally hooked sea turtles. The consideration of the effects of the presence of structures on oceanographic conditions is missing. A single structure and wind farm/regional analysis is also needed. This section should consider the range of other potential oceanographic impacts, how different sea turtles forage, and how the presence of structures may/may not impact their ability to forage efficiently, both pelagically and near the seafloor. It should also be noted that presently there is no way to mitigate potential oceanographic/atmospheric impacts. Thus this section should thoroughly explain both turbine and project-scale oceanographic and atmospheric impacts and subsequent ecosystem impacts.	
Hazel et al. 2007 states that sea turtles cannot likely avoid vessels traveling over 4 km/hr, not vessels going 10 knots. This should be corrected. Additionally, the Vineyard Wind 1 Bi-Op should not be used as justification for the impact on project vessels here, an independent analysis should be conducted. Overall the vessel strike section is incomplete with no analysis of the risk of vessel strike on sea turtles. Given that all project vessels will travel at least 10 knots and no mitigation measures are included, the risk of lethal vessel strike risk to sea turtles should be addressed thoroughly. Additional information should be provided regarding the frequency and severity of vessel strikes anticipated and which sea turtle species are expected to experience serious injury or mortality. This information is necessary to support the conclusion that there will be no population level effects. This section should not rely on the analysis of the Vineyard Wind 1 Bi-Op.	The EIS has been updated to include primary sources and the proposed mitigation measures applied to all project vessels. Additional information about Project vessel traffic and sea turtle densities within the SWDA have also been included to help assess the risk of vessel strikes in lieu of vessel strike modeling (which was not able to be conducted for this EIS).
The analysis of the Phase 2 portion of the project is incomplete and missing all relevant details. This is inconsistent with how Phase 2 is treated in the Marine Mammal section where there is some discussion of the actual project parameters of Phase 2 and ensuing impacts. This section should be significantly revised for the FEIS and clearly address all effects of Phase 2 of the project and not merely state that the impacts will essentially be the same as Phase 1 but marginally larger. We recommend that BOEM comprehensively analyze activities associated with Phase 2 in the FEIS. If Phase 2 is being considered in the EIS as part of the proposed action for which BOEM has a decision on whether to approve, disapprove, or modify the COP, we recommend that the EIS fully describe and analyze the effects of all Phase 2 activities. This is particularly important when considering the effects of activities that will be different between the two phases, such as pile driving noise (Phase 2 considers larger diameter piles), different foundation types (Phase 2 considers using suction bucket anchoring), and different cable routes.	The EIS has been updated to be more consistent with the marine mammal section.
Avoid using qualifying terms like 'small' to describe increases in vessel traffic. The data on vessel size, speed, presence, and number of trips is sufficient.	The EIS has been updated, where appropriately, to address this comment.
In regards to the table summarizing ESA effects determinations for sea turtles, many IPFs (UXOs, resource monitoring surveys, benthic/habitat disturbance, etc.) are missing from the table. The DEIS should contain a summary of the findings in the BA, merely stating that the impacts were similarly addressed in the BA is insufficient. If the BA will not be included as an appendix to the final document, we encourage BOEM to make the BA publicly available on the	The table of BA determinations and accompanying text has been removed from this section as, without the accompanying analysis from the BA, is not necessary or justified in inclusion within this EIS. Without that analysis, the determinations listed may be incorrectly interpreted. In addition, similar

Comment	Response
New England Wind webpage (not just on the ESA consultation page) so that the information can be easily referenced by the public. As currently presented, it is unclear why ESA effects determinations definitions are included in the EIS. We suggest that additional context be provided to explain how the ESA effects determinations correspond with NEPA impact levels defined at the beginning of the resource section.	tables such as this are not included in other EISs (including OW1), so for consistency, it has been removed here.
Please update this section to include a quantitative evaluation of fishery impacts using the most recent data available through the January 20, 2023, data request submitted to NMFS from Epsilon Associates. This section refers to Tables 7.6-9 and 7.6-12 in Volume III of the COP. At a minimum, these tables should be included in this EIS instead of merely a reference to the COP to enable the reader to understand the potential impacts to the commercial fishery, including the inter-annual variability of fishery revenue. For example, while the average revenue affected is listed in COP Table 3.6-9 as $569,360, 2016 revenue was over $1 million. This variability is important to note in the EIS, not just the COP. Consistent with our recommendations, EISs should include the most recent data available, including within 2 years of the project publication. Data through 2021 will be provided in response to the January 2023 data request and should be used. Finally, to ensure consistency with BOEM's draft fishery mitigation guidance, estimates of fishing revenue and shoreside support services impacted by the project should be included in the EIS to facilitate the development and evaluation of any mitigation measures or compensation programs.	Additional information has been added in Section 3.9.1.2 to provide the reader with landings and revenue data from the Lease Area as provided by NMFS in their March 2023 lease area specific planning level assessment.
Please remove reference to BOEM 2021 and the general statement that the lobster fishery is considered depleted.	The reference and sentence have been removed.
Please clarify the source of the information in Figure 3.9-3.	The popular fishing location information was taken from the following website: https://saltycape.com/top-9-spots-for-tuna-fishing-south-of-marthas-vineyard/
Please note that the fishery management measures will lead to long-term sustainability of the resource and fishery participation, as required by the Magnuson-Stevens Fishery Conservation and Management Act. Also, please reference the NMFS Stock SMART tool for information on the status of and recent trends in stock abundance and catch in the geographic analysis area and project area (available at: https://apps-st.fisheries.noaa.gov/stocksmart?app=homepage). Evaluation of such trends is necessary to understand the current biological status or future condition of fishery resources in the lease area. It also helps put the assessment of alternative impacts into context in subsequent sections such as the reference to regional trends on page 3.9-7 in Section 3.9.2.1.	Thank you for your comment.
Please insert additional details of how the No Action alternative would differ from the cumulative impacts of other regional wind and non-wind projects. The discussion in this section continues to conflate the No Action analysis with the cumulative impact analysis, as noted in previous comment letters. This section suggests the impacts would be different, but offers no detail regarding the temporal and geographical differences. This section should identify those differences and how the No Action alternative may be affected (e.g., reduced impacts to fisheries operating in this area that would not occur in other areas.). It is not enough to just note	The No Action Alternative consists of the current baseline conditions as influenced by past and ongoing activities and trends and serves as the baseline against which all action alternatives are evaluated. The EIS presented a complete description and analysis of impacts from ongoing activities and trends (i.e., No Action Alternative) and impacts from the Proposed Action and action alternatives. The No Action Alternative provides a current baseline for analysis of impacts from the action alternatives. A separate analysis of the No Action Alternative when

Comment	Response
that the impacts of the No Action alternative would be different, but not discuss how; even a qualitative discussion referencing other sections of the document would suffice.	combined with future planned activities (i.e., cumulative actions) provides the future baseline as a basis for comparison of the cumulative impacts of the action alternatives.
Under Noise, please note that pile driving noise could permanently disrupt spawning activity in a particular location even after the noise has ended, especially for species with elaborate spawning behavior such as cod and longfin squid. Both species have concentrated spawning locations in close proximity to several wind projects which would likely conduct construction activities during spawning seasons for several years.	The EIS has been updated to address this comment.
Under Presence of Structures, please include a comprehensive cumulative impacts analysis and note that species availability changes, existing/future regulations, market/fuel prices, and other social and cultural factors influence whether a vessel can or will adapt to fish in different locations (see references provided in previous EIS comment letters regarding fishing behavior patterns). If such factors limit or prevent vessels from fishing elsewhere, economic impacts could be the same as or greater than historic fishery exposure. Also, the revenue exposure does not factor increased operational costs from less efficient fishing operations, reduced product quality, or steaming to find alternative fishing grounds, which would exacerbate potential impacts. As we noted in the Ocean Wind DEIS comments, additional detail is necessary to replicate the analysis in Table 3.92 referenced in this section. Finally, Table 3.9-2 does not include the proposed action and does not represent a true cumulative impacts analysis.	The cumulative analysis includes those impacts from Alternative A in combination with other planned non-offshore wind activities and planned offshore wind activities (other than Alternative B). It is not a speculative analysis of unidentified potential future fishing regulations, market/fuel prices or other unidentified social or cultural factors. The table referenced is the annual fishing revenue in areas exposed to wind energy and cannot include the proposed action as the revenues are what they are. The level of impact analysis is commensurate with the Ocean Wind I Final EIS, and BOEM believes that the analysis is sufficient.
Under Anchoring and Gear Utilization, please revise the impact conclusions to moderate to be consistent with impact definitions in Table 3.9.2.1 and provide information on gear utilization referenced in this discussion heading. As noted in this section, fishing activities would be temporarily disrupted, but could return to normal once anchoring is completed. This is consistent with moderate impacts. Further, a June 2020 presentation by Orsted for the CVOW project indicated that spud can holes resulting from anchoring the construction vessels can substantially alter the bottom and require additional scour protection beyond that used for the turbine foundation itself. This should be noted if not already included in the 178 acres affected as identified in the COP reference noted here.	The EIS has been updated where the impact conclusion has been modified. This paragraph adequately discusses the impacts and gear utilization for Phase 1 of the proposed Project.
Under Cable Emplacement and Maintenance, please revise impacts to moderate and describe the potential impacts associated with cable preparation activities, including the use of boulder plow and grab. These activities would disrupt normal fishing operations for weeks or months, as described, but could return to normal once completed. This is consistent with moderate impacts under Table 3.9.2.1, not minor impacts. Also, please note that all gear types would likely be displaced during construction activities, not just fixed gear and that such activities may increase gear damage/loss by moving or creating new hangs and obstacles. Finally, please discuss cable armoring needs, unless discussed under presence of structures. Without additional information on potential cable repairs, it is not possible to conclude that such activities would be negligible. As noted, this section states that fishing vessels would be excluded from the area. This is consistent with moderate impacts, not negligible, regardless of the frequency of such activities.	The EIS has been updated where the impact conclusion has been modified. This section currently discusses potential impacts associated with cable preparation activities such as pre-lay grapnel run and dredging. As discussed in COP Volume I, Section 3.3.2.3, it is expected that the cables will be surveyed within six months of commissioning, at years one and two, and every three years thereafter.
Please remove discussion of Climate Change, unless Alternative B would impact climate change. This discussion is relevant to the No Action Alternative, not the proposed action.	Climate change influences ocean acidification and ocean temperatures, and has the ability to have minor to moderate long term effects on commercial

Comment	Response
	and recreational for-hire fisheries. The implementation of the Proposed Project and other future offshore wind projects would likely result in a net decrease in greenhouse gases which influences climate change. Therefore, climate change has been included in the impacts discussion for this section.
Under Noise, please revise impacts to moderate and include information similar to that under the No Action alterative. The No Action discussion indicated noise from project activities could result in behavior changes up to 8 miles away from the source, which could affect fisheries operations and result in lower catch rates and potential biological impacts (see previous comment). Impacts should be revised to moderate to be consistent with Table 3.9.2.1 because they are measurable (see research cited in the previous section) and would temporarily disrupt fishing activities for up to 78 days, as described.	The EIS has been updated where the impact conclusion has been modified.
Under Port Utilization, please insert a discussion of how port utilization would affect fisheries operations and fishing communities. Text from the No Action alternative could serve this purpose. Ensure discussion that port utilization could reduce access to port services needed by fishing vessels (fuel, provisions, repair, dockage, etc.).	The EIS has been updated where the suggested text has been added to Section 3.9.2.3.
Under Presence of Structures, please present all data and information used to justify impact conclusions and focus on impacts from presence of structures, not other IPFs. Text describing regulated fishing should be contained under the No Action alternative, as it's not relevant to the discussion of presence of structures for the proposed action. Impact conclusions are listed, but no information related to criteria listed in Table 3.9.2.1 are provided to justify those conclusions. For example, the presence of structures could have indefinite impacts on fisheries if such structures are not removed upon decommissioning, resulting in major impacts under Table 3.9.2.1. There is no information to support why impacts would be negligible or minor. Please also note that habitat conversion from soft to hard bottom could also negatively affect distribution and availability of soft-bottom species such as skates and squid, which are often caught in the project area, resulting in adverse impacts to fisheries for these species indefinitely. As such, please indicate if any differential impacts among fisheries are expected from this alternative. For specific revenue impacts from this project area, please specifically reference and include individual tables from the COP, not just an appendix (COP Appendix III-N) to help direct the reader to the source of the information. Further, this section references an analysis document that is not available to the public (King and Associates 2021) when estimating fisheries impacts. We strongly recommend the FEIS include information and analysis on fishery operations, landings, and revenue derived from information provided in response to a January 20, 2023, data request by Epsilon Associates in relation to this project and export cable routes. This will provide more recent data to assess fishery impacts if fishing effort is displaced due to project activities, including the degree of dependence upon this area for individual vessel annual fishing revenue. Finally, because this section notes that vessel operations would be impacted consistent with moderate impacts, please note if any remedial action would be taken to ensure that impacts to fisheries would not be measurable, consistent with impact definitions in Table 3.9.2.1.	Regulated fishing effort information has been removed from this section. Additional information has been added in Section 3.9.1.2 to provide the reader with landings and revenue data from the Lease Area as provided by NMFS in their March 2023 lease area specific planning level assessment.
Please update the analysis of the Phase 2 portion of the project to include all relevant details, data, analysis, and support/justification for impact conclusions. This section is incomplete and	Because impacts under Phase 2 would essentially be the same as Phase 1, the analysis for Phase 2 has been purposefully drafted to be brief to avoid

Comment	Response
should be significantly revised for the FEIS and clearly address all effects of Phase 2 of the project and not merely state that the impacts will essentially be the same as Phase 1 but marginally larger. We recommend that BOEM comprehensively analyze activities associated with Phase 2 in the FEIS. If Phase 2 is being considered in the EIS as part of the proposed action for which BOEM has a decision on whether to approve, disapprove, or modify the COP, we recommend that the EIS fully describe and analyze the effects of all Phase 2 activities. This is particularly important when considering the effects of activities that will be different between the two phases, such as pile driving noise (Phase 2 considers larger diameter piles), different foundation types (Phase 2 considers using suction bucket anchoring), and different cable routes. Because the majority of vessels fishing within the project area come from ports to the west, a more detailed description of the impacts from the South Coast Variant under Phase 2 is necessary. NMFS received a data request for fishery revenue affected within the project area and the two cable corridors on January 20, 2023. Such data should be analyzed and integrated into the FEIS.	redundancy. Additional information has been added in Section 3.9.1.2 to provide the reader with landings and revenue data from the Lease Area as provided by NMFS in their March 2023 lease area specific planning level assessment.
Under Cumulative Impacts, please insert information and appropriate analysis to support the impact conclusions listed here. As noted, up to seven wind projects in the immediate vicinity of the proposed action (i.e., the RI/MA lease areas) would be under construction, along with other regional wind projects that affect similar fishery resources and fishing ports. Such projects should be specifically listed, along with the fisheries and ports that may be affected to offer a more complete description of the cumulative impacts of this action. This section does not contain any estimate of cumulative fishery revenue exposure to vessels or shoreside support services from the proposed and expected projects. Data are available to estimate such impacts based on the January 20, 2023, data request submitted by Epsilon Associates and available on the GARFO website (https://www.greateratlantic.fisheries.noaa.gov/ro/fso/reports/ WIND/ALL_WEA_BY_AREA_DATA.html). Recommendations to assist with estimating shoreside impacts based on changes to fishery landings is outlined in BOEM's draft fishery mitigation guidance (https://www.boem.gov/sites/default/files/documents/renewableenergy/DRAFT%20Fisheries%20Mitigation%20Guidance%2006232022_0.pdf) and associated Appendix A (https://www.regulations.gov/document/BOEM-2022-0033-0001). We strongly recommend you include such an analysis in the FEIS to enable readers can understand the regional cumulative impacts of offshore wind projects on fishery operations and associated communities and that appropriate mitigation and compensation measures can be identified consistent with BOEM's guidance.	Ongoing offshore wind leasing activities on the Atlantic OCS are described in Final EIS Appendix E, Table E-1.
Under Conclusions, please incorporate revisions based on our previous comments. For example, climate change is not related to Alternative B and should be removed from this section, with only IPFs relative to the proposed action being discussed. As noted in earlier sections, impacts are measurable in the project area. Therefore, please describe any mitigation measures or proper remedial action that would be adopted to reduce or eliminate any measurable impacts and provide support for the conclusion that resources would likely recover over time. The mitigation measures described at the bottom of page 3.9-30 do not contain sufficient detail to understand the amount of funding dedicated and why only Connecticut fishermen would	Climate change influences ocean acidification and ocean temperatures, and has the ability to have minor to moderate long term effects on commercial and recreational for-hire fisheries. The implementation of the Proposed Project and other future offshore wind projects would likely result in a net decrease in greenhouse gases which influences climate change. Therefore, climate change has been included in the impacts discussion for this section. The mitigation and monitoring measures that the applicant has committed to

Comment	Response
benefit when vessels from MA, RI, and NY are substantially more impacted by this project than CT vessels according to our estimates.	implement (including and in addition to those defined in the COP) are listed in Final EIS Appendix H, Table H-1. Mitigation and monitoring measures that may result from reviews under certain statutes are shown in Table H 2. Tables H-1 and H-2 provide descriptions of mitigation or monitoring measures, along with the resource or resources to which each measure applies.
Please simplify the description of these alternatives and more fully discuss the potential impacts to affected fisheries from the combined effects of Phase 1, 2, and other adjacent projects using the same route to put such impacts into context. The narrative explaining the combinations of alternative routes and implications on fisheries is difficult to follow. Integrating or referencing the cable route table in Section 2 may be helpful in allowing the reader to appreciate the impacts. This section should also note that fisheries for both hard bottom and soft bottom species operate in and around Muskeget Channel that will be impacted differently by each alternative. It is difficult to suggest that impacts on fisheries would be lower for one route or another, as it depends upon the species habitat that is affected. Impacting softer sediment on the eastern route will more greatly affect the longfin squid fishery, which is the primary fishery affected in terms of landings and revenue in both Vineyard Wind 1 and New England Wind project areas. Therefore, Alternative C-1 would have more impacts on the squid and conch fisheries, while Alternative C-2 would impact more hard bottom fisheries such as striped bass, black sea bass, and cod. Also, because South Coast (Mayflower) Wind intends to locate their export cable along the western route (see Figure 2.1-1) and Vineyard Wind 1 will already use the eastern route, impacts to all fisheries are likely to result from the combined projects regardless of the option selected for this project.	A reference to Table 2.1-2 in Section 2 was added to provided additional reference to the potential cable route scenarios. As noted in Final EIS Section 3.9.2.4 Alternatives C-1 and C-2 could have marginally lower impacts on commercial and for-hire recreational fishing than the Proposed Alternative. However, these differences in impacts would not result in meaningful different impacts that those of the Proposed Alternative. More information on the potential impacts associated with Project Alternatives C-1 and C-2 on commercial and for-hire recreational fisheries were addressed in Section 3.9.2.4.
NMFS agrees with the USCG concerns expressed regarding the potential location of two ESP foundations at a single position within the SWDA. This would violate the 1nm x 1nm turbine layout proposed by developers to reduce navigation and safety concerns expressed by both the USCG and fishery participants. NMFS supports the mitigation measure suggested by BOEM (prohibit the co-location of two ESP foundations on one foundation position), but suggest it should not be considered a mitigation measure, but rather a component of the project design and proposed action, as initially announced to the public.	The COP notes that New England Wind will adopt the 1 x 1 NM WTG/ESP layout in accordance with the USCG's recommendations contained in the May 2020 MARIPARS. Additionally, the 1 x 1 NM grid layout is also part of the Proposed Action in the EIS. Co-located ESPs could incrementally increase navigational risks and hazards from allision and collision and complicate SAR activities, and could continue to result in moderate impacts on navigation and vessel traffic. Mitigation and monitoring measures for the project are presented in Appendix H of the EIS which include those mitigation and monitoring measures that BOEM would require as a condition of COP approval.
Please describe and analyze navigation impacts of Phase 2 of the project. This must be included in the FEIS if it is to be a component of the proposed action.	Phase 1 and Phase 2 of the Project are discussed in each resource section of Chapter 3. Where they exist, the differences between the Phases are called out and differing impacts are discussed. Overall, activities associated with Phase 1 and Phase 2 are similar in nature and addressed accordingly in the Final EIS.
Please insert reference to the NMFS-BOEM survey mitigation plan throughout this section, noting that while the plan has been finalized, additional development of survey-specific mitigation plans is ongoing and that funding is still lacking to implement these plans once	The NMFS-BOEM survey mitigation program is discussed in Final EIS Section 3.14.2.1. Additional text regarding this program was also added to Final EIS Section 3.14.1.6.

Comment	Response
completed, which will limit the potential mitigation of such a strategy until resources become available.	
Both Rutgers University and the Woods Hole Oceanographic Institution operate oceanographic high-frequency (HF) radar systems in the region of the project, and all these HF-radars are part of the NOAA IOOS National Network. In § 3.14.1.5 "Existing Radar Systems" (p. 3.14-6; Vol. 1), would you please: (1) Replace the first sentence of the second paragraph with the following: "Rutgers University and the Woods Hole Oceanographic Institution maintain a series of coastal high-frequency (HF) radars that study ocean currents as part of the NOAA Integrated Ocean Observing System (IOOS) National Network, including installations on Nantucket, Martha's Vineyard, and Block Island (Roarty 2020)." and (2) Replace the last sentence of the third paragraph with the following: "Additionally, 12 oceanographic HF radar sites of the NOAA IOOS network were identified in the vicinity of the SWDA. Also there are two navigational aid sites in Martha's Vineyard and Nantucket." [NOAA/NOS/IOOS]	Final EIS Section 3.14.1.5 has been revised to address this comment.
In the sentence: "Next Generation Weather Radar (NEXRAD) is a network of 160 high-resolution Doppler weather radars, operated by the National Weather Service (NWS), used for weather forecasting purposes." - Please change number of NEXRAD radars to 159. [NOAA/NWS/ROC]	Final EIS Section 3.14.1.5 has been revised to address this comment.
Under Scientific Research and Surveys, delete reference to climate change and replace it with "other offshore wind projects" as ongoing activities affecting scientific research and surveys. Climate change does not cause the effects listed, but other wind projects would.	Final EIS Section 3.14.2.1 has been revised to address this comment.
This section omits that both Rutgers University and the Woods Hole Oceanographic Institution operate oceanographic high frequency (HF) radar systems close enough for the WTGs to adversely impact, and that all these HF-radars are part of the NOAA IOOS National Network. Additionally, the section neglects to mention that neither the FAA nor the Clearinghouse evaluate NOAA oceanographic HF radar systems and that mitigations for HF radars are to be evaluated by the NOAA IOOS Surface Currents Program. On pp. 3.14-14 to 3.14-15 (p. 441–442 of Vol. 1 PDF) in "Radar Systems", would you please: (1) In the first paragraph, replace its third sentence which begins "Rutgers University" with the following: "Rutgers University indicates that the operational WTGs could affect signals from the oceanographic HF radars it and the Woods Hole Oceanographic Institution operate as part of the NOAA IOOS network (Roarty 2020)." (2) Replace the second paragraph with the following: "Through partnership with the NOAA IOOS Surface Currents Program plans will be developed to mitigate WTG interference to oceanographic HF radars. The FAA would evaluate potential impacts on those radar systems that fall within its purview, as well as mitigation and monitoring measures for those impacts through their review of Form 7460-1 for individual WTGs within U.S. territorial waters (as explained in the National Security and Military Uses discussion) (FAA 2019a). Developers of other offshore wind projects would be required to coordinate with Federal agencies managing potentially impacted radar systems, including military and national security agencies to identify potential impacts and any mitigation and monitoring measures specific to radar systems, in accordance with FAA Order JO 7400.2M (FAA 2019a). For example, the Bay State Wind Project received Determinations of No Hazard for WTGs with heights of up to 1,049 feet AMSL. Although WTGs associated with the Bay State Wind Project were found to be	Final EIS Section 3.14.2.1 has been revised to address this comment.

Comment	Response
within the direct line-of-sight for the Falmouth ASR-8, Nantucket ASR-9, and Coventry (Rhode Island) ASR-9 radar systems, the aeronautical study determined that the Bay State Wind Project's WTGs would not have a substantial impact on radar operations at the time of study (FAA 2019b). BOEM assumes that each project applicant would conduct an independent radar analysis, particularly for WTGs outside of U.S. territorial waters, to identify potential impacts and any mitigation and monitoring measures specific to aeronautical, military, ocean observing, and weather radar systems for each WTG analyzed, per BOEM-identified BMPs (Table E-5 in Appendix E).31 BOEM would continue to coordinate with the Clearinghouse and NOAA IOOS to review each proposed offshore wind project on a project-by-project basis and would attempt to de-conflict project concerns identified through such consultation related to oceanographic (via NOAA IOOS) and military and national security (via the Clearinghouse) radar systems with COP approval conditions, including concerns related to installation of multiple projects. Impacts on radar systems would gradually decrease during decommissioning as WTGs are decommissioned and removed." [NOAA/NOS/IOOS]	
This section needs to clarify that the applicant won't just "evaluate" interference to IOOS oceanographic HF radars, but will also mitigate it. In Section 3.14.2.3 "Radar Systems" (p. 3.14-23; Vol. 1), would you please: (1) Replace the second to the last sentence of the third paragraph with the following: "For oceanographic HF radar systems, the applicant would consult with the radar operators and NOAA's IOOS Office to evaluate whether the proposed WTGs are expected to cause radar interference to the extent that radar performance is affected and implement mitigations identified by the IOOS Surface Currents Program accordingly." [NOAA/NOS/IOOS]	Final EIS Section 3.14.2.3 has been revised to address this comment.
For weather radars, a U.S. Department of Energy screening tool for WTG siting did not identify any potential conflicts between Phase 1 and ground-based NOAA NEXRAD weather radars (COP Volume III, Section 7.9.2; Epsilon 2022a) - Would it be possible for the Radar Operations Center to be involved in such determinations. We run analysis on all wind farms to ensure there are no issues? [NOAA/NWS/ROC]	Review by the Radar Operations Center is outside of BOEM's statutory and regulatory authority under NEPA but could potentially be adopted and imposed by NOAA as part of its permitting process.
2nd sentence same paragraph: "WTGs located in other NEXRAD lines of sight can affect radar reflectivity, internal algorithms that generate alerts and derive weather products, and other attributes and functions." - This needs to include velocity. [NOAA/NWS/ROC]	Final EIS Section 3.14.2.3 has been revised to address this comment.
3rd sentence same paragraph: "In general, the severity of impacts is related to the separation distance between the WTGs and the NEXRAD facility, with impacts increasing as distance decreases, especially for WTGs located within 11 miles of the NEXRAD facility (COP Volume III, Section 7.9.2.2; Epsilon 2022a)." - NEXRAD WSR-88D radars can be affected as far out as 60 nautical miles depending on terrain. [NOAA/NWS/ROC]	Final EIS Section 3.14.2.3 has been revised to address this comment.
Under Presence of Structures, please revise the impact conclusions for Scientific Research and Surveys to major instead of minor to moderate, or specifically reference major impacts to NMFS surveys throughout this section and note that other surveys and research may have lower impacts due to the use of smaller vessels or different gear types. This is consistent with impact level definitions in Table 3.15-1 and previous impact conclusions for other project EISs.	The minor to moderate impact is for construction only. The remainder of the section discusses the major impacts during operations; therefore, the EIS has not be changed.

Comment	Response
Under Noise, please reference or describe the mitigation and monitoring measures that would be implemented to prevent population-level harm to fish and marine mammal populations. This is necessary to validate claims that no long-term impacts would occur from noise.	The EIS has been revised to indicate that this sentence refers to measures included in the RODs for other projects. Restating the mitigation measures for every other project is outside of the scope of this Final EIS.
Please ensure that all references to recreational fishing for highly migratory species includes both private angling and for-hire fishing operations and that the impacts to both types of operations are the same. In several instances throughout this section, the text implies that fishing for such species is limited to for-hire operations and that impacts to private anglers and for-hire vessels would be different. Because both type of operations utilize the same gear types and fishing activities, impacts would be similar for both (moderate), which should be noted throughout this section.	The EIS has been updated to include a note indicating that the section speaks generally of both kinds of recreational fishing, and referring readers to Section 3.9 for more information.
Please modify all references to the BA to read "BOEM's BA." Currently this section reads as though that document was written and approved by other agencies. Please modify the sentence "BOEM has initiated consultation on the proposed......" to read "BOEM has REQUESTED consultation on the proposed......"	The EIS has been updated to address this comment.
Please modify the last sentence that reads "The Final EIS analysis of effects and conclusions...." to read "The analysis of effects and conclusions..."	The EIS has been updated to address this comment.
NMFS requests further clarification for the bounding of the Geographic Analysis Areas (GAAs). Please either provide a detailed explanation in the text for the reason the GAA was restricted to capturing "the majority of the movement range for most species," and not all movement and all species, or expand the boundary of the GAA to include all movement of all species. NMFS has made this comment on multiple other project EISs, but this issue remains unresolved.	A number of the species captured within the resource areas are highly mobile and can be cover a significantly large range. The Geographic Analysis Areas developed for each resource is intended to capture the majority of the species movement range within U.S. and Canadian waters. While some species or life stage may extend past the designated GAAs, such highly migratory fish species, larval transport, and migratory marine mammals, it has been determined that the GAAs for each resource are adequate for evaluating the impacts of the New England Wind Project. Clarifying text was added to Final EIS Appendix D. The Geographic Analysis Area for each resource is depicted and/or described within each associated resource section to provide context on their extent. The effects of the Project on each resource is described in each resource section.
Please include a short explanation at the end of the paragraph about whether the list of activities in Appendix E has been developed for this specific project, or whether this same list of activities was developed for and is being included for all OWS projects in the Atlantic, regardless of project location, scale or details. This issue has also been identified by NMFS in CVOW, Ocean, Empire, and Mayflower.	As noted in Final EIS Appendix E.3, BOEM analyzed the possible extent of future offshore wind energy development activities on the OCS, and provides Table E-1 which represents the status of projects as of April 5, 2023. This table is generated by BOEM for all OSW projects in the Atlantic.
Anchoring and gear utilization/marine resource surveys is included in all three alternatives (Sections 3.7.2.1 - 4) as a primary IPF but not included in the table. UXOs (noise and habitat impacts) should also be included.	Anchoring and gear utilization and UXOs have been added Table G.1-4 in Final EIS Appendix G.
Please modify the third paragraph, second sentence, to read something like: "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, and indicate that any	The EIS has been updated to address this comment.

Comment	**Response**
mitigation measures that are analyzed in the impact analysis of the selected alternative, and which influenced the impact determinations under that alternative, will be adopted." Please either delete the sentence that reads: "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," or modify it to explain that additional NEPA analyses will be conducted in such circumstances. Any mitigation and monitoring measures/terms that influence the impact conclusions and final agency decision need to be committed measures in order for the assumptions and conclusions of the analysis to be accurate. This comment has been made previously in other EISs. NMFS continues to have concerns that uncommitted mitigation measures are being included in the analysis that change the impact determinations.	
Despite being mentioned in several places throughout Vol. 1 of this DEIS, mitigation of WTG interference to the oceanographic HF radar systems has been omitted from Appendix H. All other OSW project DEIS's have this in their "Mitigation and Monitoring" appendices, so its omission from this New England Wind DEIS is a noticeable oversight. For Table H-2 on p. H-24 (Appendix H), after the row with "Measure Number" 81, would you please insert another row with the following values (and then renumber the remaining rows' Measure Numbers accordingly)?: • "Measure Number" = 82. • "Project Stage" = Construction, Operations, Decommissioning. • "Measure Title" = Mitigation for oceanographic high-frequency radars. • "Measure Description" = To mitigate operational impacts on oceanographic high-frequency (HF) radars, the applicant will develop a plan with the NOAA Integrated Ocean Observing System (IOOS) Surface Currents Program for data sharing from turbine operators to include: (a) sharing real-time telemetry of surface currents, waves, and other oceanographic data measured at locations in the Project into the public domain; and (b) if needed by the IOOS Surface Currents Program to enhance mitigation, additionally sharing time-series of WTG blade rotation rates, nacelle bearing angles, and other information about the operational state of each of the Project's turbines with HF radar operators to aid interference mitigation. • "Resource Area Addressed (EIS Section)" = Other Uses (3.14) • "BOEM's Identification of the Anticipated Enforcing Agency" = NOAA, BOEM, BSEE. [NOAA/NOS/IOOS]	The EIS has been updated to address this comment.
There are references with the same citation abbreviation throughout this section, for example NMFS 2022b is listed twice but as different references. The page number for that example is noted here, but please review the entire section.	The EIS has been updated to address this comment.

O.4.1.4 National Park Service

Table O.4-4: Responses to Comments from the National Park Service

Comment	Response
We are a bit confused as to whether the Terrestrial Archaeological Resources Assessment (TARA) has been made available. We received a set of terrestrial archaeological reports that the developer prepared as an appendix to the Construction and Operations Plan (COP). Is that Appendix considered the TARA? It is also unclear which of these historic documents are supposed to be prepared by BOEM or its contractor; which can be prepared by the developer as a part of the COP; and of those, which have been reviewed by BOEM's subject matter experts.	The applicant is required to prepare the TARA, which is provided as COP Appendix III-G for the proposed Project.
the Draft EIS states, "BOEM assumes that FAA hazard lighting for all offshore wind projects in the RI/MA Lease Areas would use ADLS" (Draft EIS, pg. 3.10-13). The draft Memorandum of Agreement (MOA) addressing impacts under Section 106 of the National Historic Preservation Act (NHPA) states that "Park City Wind will equip all WTGs and ESPs with an aircraft detection lighting system to reduce the duration of nighttime lighting" (MOA, pg. 7). But this is an unsigned draft prepared by BOEM. Please clarify the level of commitment the developer has to ADLS use or that BOEM would require in order to approve the COP. In addition, we appreciate the addition of requiring compliance with NPS sustainable lighting best practices "where safe and feasible" (Measure No. 87 in Appendix H, Mitigation and Monitoring, Table H2, pg. H-25).	As stated in Appendix H, Table H-1 of the Final EIS, the applicant has committed to the 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.
NPS had questioned how BOEM arrived at the conclusion that "nighttime lighting impacts would be restricted to cultural resources for which a dark night sky is a contributing element to their historic integrity, cultural resources stakeholder use at night, and resources that do not generate a substantial amount of their own light pollution," and asked for a law or policy citation. In response in other Draft EISs recently issued, BOEM stated that their approach to nighttime lighting impacts is currently being revised. Is this revision complete? NPS is interested in understanding the approach BOEM is (now) planning to use. We don't see any change in approach in this Draft EIS. It should be noted that dark and dark nighttime sky may not, and more often than not will not, be explicitly identified as a contributing element of a site's historic integrity or cultural resources stakeholders use at night. For resources such as light houses/stations and observatories it should be assumed, but there are many resource types with nighttime/ dark sky values. For example, resources associated with historic events that may have occurred in night hour such as underground railroad network to freedom and battlefields and other values associated with darkness as part of a setting, or place of contemplation for visitors.	Thank you for pointing out the wide range of historic properties for which a dark nighttime sky would be a contributing element. The HRVEA documentation that supports the assessment of visual effects in the Draft EIS does not simply rely upon National Historic Landmark or National Register of Historic Places nominations and whether or not those identify a dark night sky as a contributing element (Epsilon 2022; Appendix H.b). Rather, each historic property is analyzed to consider the historic significance and character and whether or not an ocean view or a dark nighttime sky is a character-defining feature. Further, the use of ADLS and the project amount of time lighting would be activated is also a factor in the visual analysis (BOEM 2023; Appendix I).

O.4.1.5 U.S. Coast Guard

Table O.4-5: Responses to Comments from the U.S. Coast Guard

Comment	Response
The proposed action to co-locate ESPs is a deviation from the developer's previously agreed upon layout proposals as discussed with the USCG and based on recommendations from the MARIPARS. This deviation could result in increased risk to navigation and vessel traffic and may complicate USCG SAR activities. Therefore, the USCG supports the identified mitigation measure to eliminate the option for co-located ESP foundations as a condition of Construction and Operations Plan approval.	The COP notes that New England Wind will adopt the 1 x 1 NM WTG/ESP layout in accordance with the USCG's recommendations contained in the May 2020 MARIPARS. Additionally, the 1 x 1 NM grid layout is also part of the Proposed Action in the EIS. Co-located ESPs could incrementally increase navigational risks and hazards from allision and collision and complicate SAR activities, and could continue to result in moderate impacts on navigation and vessel traffic. Mitigation and monitoring measures for the project are presented in Appendix H of the EIS which include those mitigation and monitoring measures that BOEM would require as a condition of COP approval.
USCG recommends all Applicant-Proposed Measures (Table H-1) and Other Potential Mitigation Measures (Table H-2) of Appendix H be made mandatory, especially measures that address major impacts to USCG SAR activities such as providing access to web-based cameras.	"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.
The USCG also does not oppose either Alternative C-1 or C-2, which addresses the Project's export cable routing impacts to complex fisheries habitat.	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)."
The USCG does not oppose the Proposed Action Alternative, noting the Project would maintain a uniform east-west and north-south grid pattern of 1 x I nautical mile (NM) spacing between wind turbines and alignment with proposed adjacent wind farms.	Thank you for your comment.
The USCG requests all references to Navigation and Vessel Inspection Circular (NV1C) 02-07 be replaced with the most recent version; NVIC 0 1-1 9.	Thank you for your comment.

Comment	Response
The Commander, Coast Guard First District may consider the establishment of safety zones in the Project area on a case-by-case basis. Safety zones will not be granted for the sole purpose of keeping project construction on schedule and the authority should not be used as a mitigation measure when considering potential risks and impacts.	The Final EIS has been updated to include this reference.
Post Record of Decision Involvement: The USCG requests timely access to construction plans, such as Facility Design Reports and/or Fabrication Installation Reports for the purpose of identifying activities impacting Navigation, Vessel Traffic, and USCG missions on the Marine Transportation System, especially Cable Burial Plans and their associated risk and feasibility assessments. Early access to these documents may prevent conflicts with planned activities.	Thank you for your comment.
The USCG requests the opportunity to suggest amendments to approved mitigations and terms and conditions at any time before, during, or after installation of the wind farm should material facts or circumstances come to light that were either unforeseen or were not reasonably available at the time these conditions were issued...The USCG requests the opportunity to re-evaluate any future mitigation analyses required by the Department of Interior, especially related to Navigation and Vessel Traffic, USCG missions, and Other Uses, such as National Security and Military Activities, Aviation and Air Traffic, and Radar Systems.	BOEM will work with the USCG on the required reviews of these reports to allow for proper considerations.

O.4.2 Cooperating State Agencies

O.4.2.1 The Massachusetts Office of Coastal Zone Management

Table O.4-6: Responses to Comments from the Massachusetts Office of Coastal Zone Management

Comment	Response
CZM is supportive of alternative C (and C-1) to minimize disturbance to important fisheries habitats in Muskeget Channel. As Vineyard Wind is currently installing cable, they should share site-specific information with NEW and BOEM regarding seafloor conditions to facilitate the planning of a specific cable-placement plan that results in the least impact on important benthic habitats. Unless site-specific information dictates otherwise, it appears that alternative C-1 will reduce impacts as all cables would run alongside the Vineyard Wind and Phase 1 cables. This is primarily because cable crossings with SouthCoast Wind would be avoided in the C-1 alternative, and because disturbance and monitoring would be confined geographically to one area.	Thank you for your comment.
BOEM notes that the SCV could not be excluded from the project design envelope because it is a necessary contingency for project feasibility. However, every effort should be made to avoid this contingency to minimize seafloor disturbance. In the event that the SCV OECC cannot be avoided, PCW and BOEM should coordinate with SouthCoast Wind to collocate the SCV with the Somerset-bound cables already planned by SouthCoast Wind. Colocation with SouthCoast Wind will minimize disturbance, hard cable protection, and overall impact to seafloor habitats.	The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.
The COP Appendix III-N contains a draft economic exposure of commercial fisheries that includes both direct impacts to fisheries (e.g. lost landings) as well as indirect and induced impacts (e.g. broader economic impacts of those lost landings) via a multiplier. There is also an addendum for the SCV export cable route specific to the economic exposure for that contingent cable corridor. The economic exposure analysis shows that 45% of the average annual commercial fishing revenue from the NEW area is landed in Massachusetts. PCW should use the most accurate and complete data to inform the economic analysis. A complete analysis should also include economic exposure from all phases of the project from construction through operation and decommissioning, a breakdown by port, gear type, and species for each economic factor examined, and it should include exposure from 3 | P a g e for-hire and charter recreational fisheries as well as commercial fisheries. Most importantly, a multiplier should be determined with local knowledge and input that accurately reflects the broader impacts to the economy beyond lost landings.	BOEM believes the economic exposure analysis presented is sufficient to properly analyze potential impacts to commercial and for-hire recreational fishing from the proposed project.
The commitment by PCW to target a 12 dB noise reduction using NAS [Noise Attenuation System] for all pile-driving activities is a critical mitigation measure that will protect marine mammals, sea turtles, as well as other species. As	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

Comment	Response
construction plans are finalized, PCW should pursue the best available NAS technology, including single or double bubble curtains or other technologies to minimize impacts on sensitive marine species. PCW should also assess the use of NAS during the controlled detonation of unexploded ordnance.	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.
PCW should coordinate with Massachusetts agencies on mitigation opportunities for avifauna impacts, including identifying opportunities to support conservation and habitat restoration or enhancement for protected avian species.	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.
As monitoring plans are further refined, the proponents of this project should continue to work with ROSA, RWSC, and other research groups and offshore wind developers to coordinate reporting of data generated. In particular, PCW should share data publicly in streamlined and standardized formats that include metadata such as coordinates, depths, measurement units, method and instruments used, and other details needed to understand and replicate the data and analyses. When relevant, data should be shared in a standardized format appropriate for spatial data such as shapefiles. Data recording protocols should also conform to accepted standards of practice for the data type, e.g. Coastal and Marine Ecological Classification Standard (CMECS) for benthic data.	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).
For the proposed New England Wind project, potentially impacted SSU [Special, Sensitive, or Unique] resources include areas of hard/complex seafloor, eelgrass, and North Atlantic right whale core habitat...Maps of hard/complex seafloor were developed for the OMP [Massachusetts Ocean Management Plan] using the best available data at the time. The resulting map "…is based upon the highest resolution data available, and a specific project may obtain higher resolution data for project planning purposes." Additional data collected by a project proponent may be required to confirm the presence or absence of an SSU resource and that certain projects may acquire the higher resolution data through site-specific characterization. NEW should consult with CZM regarding the conformance of the project with the siting and performance standards of the OMP.	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).

O.4.2.2 Rhode Island Coastal Resource Management Council

Table O.4-7: Responses to Comments from Rhode Island Coastal Resource Management Council

Comment	Response
Rhode Island CRMC recommends the cable routing alternatives, Alternative C, be utilized as they would minimize impacts to Rhode Island coastal resources and users located and identified in the CRMC's 2011 and 2018 GLDs. Alternative C-1 would avoid using the Western Muskeget Variant cable scenario and limit the total number of potential crossings of the SouthCoast Wind cable. Alternative C-2 would minimize the use of the Eastern Muskeget cable corridor. Both alternatives would potentially reduce impacts on productive habitats along the Muskeget Channel by collocating cables with the Vineyard Wind project and by providing a more direct route from the lease area to interconnection points at Barnstable, Massachusetts.	Thank you for your comment.
The SCV passes through both the 2011 and 2018 GLDs and would be located in reasonable proximity to South Coast Wind's Brayton Point export cable corridor. This route passes through extensive stretches of dense surface and subsurface boulder fields as well as complex bottom habitats, each of which has similar characteristics, values and resources as those found in Rhode Island state waters. Additional seafloor disturbance would result in unnecessary impacts to benthic resources and commercial/recreational fishers.	The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.
[a] COP revision [for the South Coast Variant] would require a new CZMA consistency certification under 15 C.F.R. § 930.85 and/or § 930.51(b) (major amendment). BOEM should contact and coordinate with state cooperating agencies to inform decisions surrounding the SCV.	The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.

O.5 Responses to Other Agency, Stakeholder, and Public Comments on the Draft Environmental Impact Statement

O.5.1 Purpose and Need

Table O.5-1: Responses to Comments on the Purpose and Need

Comment Number	Comment	Response
0003-01	This project will help us meet our increasing energy needs and address the worsening climate crisis. I urge you to approve this project.	Thank you for your comment.
0004-01	Committed to helping our island of Martha Vineyard reach our 100% renewable energy and fossil fuel reduction targets by 2040.	Thank you for your comment.
0005-01	Temperatures and sea levels are rising - projects like this one are essential to protect Cape Cod from these existential threats.	Thank you for your comment.
0007-01	These comments support the approval of the New England Wind Draft Environmental Impact Statement. The approval of the Draft Environmental Impact Statement will assist in significant environmental improvements. Please proceed with approval.	Thank you for your comment.
0008-02	I am equally concerned about the role offshore wind will play in securing the reliability of the New England electric grid. In short, offshore wind must be New England’s energy future, and New England Wind is central to that future. As New England loses its nuclear power resources and has no guarantee of substantially more Canadian hydro power, offshore wind is simply the only way New England can assure the reliability of its electricity supply. Thankfully, solar power is expanding, but solar in our area of the country has a capacity factor of only about 14%, as compared to the capacity factor of offshore wind in southern New England of close to 50%.	Thank you for your comment.
0008-03	At this point in history, offshore wind is a completely mature, reliable technology. I am sure you know better than I the experience with offshore wind in the North Sea and other areas of Europe—tens of wind farms and thousands of wind turbines.	Thank you for your comment.
0008-04	I appreciate that the effects of wind power on fisheries, marine mammals, and birds must be mitigated. But let’s remember that climate change itself has seriously adverse effects in these regards. Offshore wind in Massachusetts and this region is, literally, our lifeline—for an adequate power supply as we turn increasingly to electrification, as we reach for our climate goals, and as we develop clean energy jobs.	Thank you for your comment.

Comment Number	Comment	Response
0009-01	The clean energy to be produced by New England Wind is urgently needed to enable Martha's Vineyard and the Commonwealth to meet their declared renewable energy goals and their growing demand for electricity. While other parts of the country may have other renewable energy resources, in the Northeast the major resource we have and the one we need to rely on is offshore wind. Without offshore wind projects such as New England Wind, we simply can't hope to significantly reduce our carbon emissions and mitigate our contribution to climate change...As the Commonwealth and many Massachusetts municipalities work toward their ambitious goals of moving off fossil fuels, their need for electricity from the grid will increase greatly. Offshore wind power will be critical to enabling the utilities to meet this need.	Thank you for your comment.
0009-02	New England Wind has specifically committed to help our island of Martha's Vineyard to reach its targets of 100 percent renewable energy and fossil fuel reduction by 2040. The project also will help to meet the growing need for electricity in the region.	Thank you for your comment.
0016-01	We know that the Danish have decades of experience and proof that the windmills are sustainable and efficient. We see the impact of climate change here and around the world. Time to act! We are already decades behind the power curve.	Thank you for your comment.
0020-01	This project has considerable environmental and economic benefits, and I fully support it. The vast majority of the potential impacts examined in the Draft EIS are either determined to be of minor concern at best or are even potentially beneficial. We so desperately need a more well-rounded economy on Martha's Vineyard. Please approve this project.	Thank you for your comment.
0021-01	Offshore wind even if it ends up being a stopgap approach is our best bet for creating much needed additional generation, a more stable grid and the cleanest and most renewable energy available. We have no time to waste. Climate change is accelerating and the damage to our oceans, vistas and marine life is at a much greater threat from climate change and additional fossil fuel use than from the construction and installation of offshore wind.	Thank you for your comment.
0022-01	I support this project due to the critical need for our state and region to address climate change and reduce our reliance on fossil fuels.	Thank you for your comment.
0024-01	The New England Wind Project (the Commonwealth Wind and Park City Wind projects) will greatly contribute to our efforts to mitigate climate change by reducing global greenhouse gas emissions; and it will have a positive impact on sea level rise and reduce potential negative impacts to our coastal shorelines and ocean acidification impacts.	Thank you for your comment.
0025-01	Renewable energy projects at this industrial scale are essential if local towns, states, and the Nation are to achieve the ambitious goals set to combat climate change.	Thank you for your comment.

Comment Number	Comment	Response
0025-02	All six towns on Martha's Vineyard have committed to being 100% renewable in transportation, heating, and electricity by 2040.	Thank you for your comment.
0028-01	The New England Wind project, proposed by Avangrid, is the largest renewable energy project proposed in the New England region and will play a major role in helping the Northeast meet regional commitments for offshore wind energy production.	Thank you for your comment.
0032-01	We support the New England Wind project for three reasons. First and foremost is the critical need to address climate change and reduce the region's carbon usage. The project will generate enough renewable, affordable power to reduce emissions by nearly four million tons. In addition, the more than 2 gigawatts of energy are enough to power over one million households across New England and will significantly reduce consumer costs over time.	Thank you for your comment.
0044-01	This project has been in the works for a long time, despite many Cape Codders' belief that it's suddenly been sprung on us, planned behind closed doors, etc. I am very proud that my hometown will be a model for green energy works in the future. Temporary inconveniences for us are well worth what we all gain in the end.	Thank you for your comment.
0046-11	The effects of Global Warming have also not been accounted for. There will be changes in the wind production as heat gradients change. This will render wind farms less effective producers of clean energy. The destruction and cost to benefits ratio must be re-evaluated. Rising ocean levels will make Hydro power production even a greater leading source of clean energy than the 71% worldwide position it now occupies.	Thank you for your comment.
0049-01	Big wind offshore projects are based on the false premise of " taming Mother Nature". It doesn't work. It's an expensive, inefficient , toxic complicated system that puts our fragile coastal ecosystems, our 217 mass. Endangered species—18 of which are federally protected—our environment and our way of life at risk. There are alternatives!! Big wind offshore projects are plagued by catastrophic failures above n below sea level . Even their own partner Orsted got out due to " catastrophic undersea issues. They r not green or clean but use copious amounts of petrochemicals n fossil fuels :coal,steel,plastic,cement,lead,crude oil, diesel fuel. Etc.	Thank you for your comment.
0049-07	we urge u to do the due diligence that was not done when the 2030 goal was thrown out there, to honor our state n federal laws designed to protect ag. Thus destruction, to protect our whales n sea life, to look at alternatives n to do what's right for our country.	The New England Wind Project will adhere to all applicable federal, state, and local laws.

Comment Number	Comment	Response
0054-03	WE FEEL THAT THIS RUSHED INDUSTRIAL PROJECT AT THE MERCY OF AN ARBITRARY AND UNREASONABLE DATE OF 2030 TO ACCOMPLISH, WILL IRREPARABLY HARM A PRISTINE PLACE AND ALL WHO LOVE IT AND LIVE HERE.	Thank you for your comment.
0055-01	The SWDA includes lease area 534 and potentially a portion of lease area 501 which is assigned to Vineyard Wind 1. This section also states that the project could generate up to 2,600 MW across both phases to meet existing and potential future offtake demands (Table 2.1-1). The project size and minimum number of turbines that would meet BOEM's purpose and need is unclear. This poses challenges for determining which final configurations of the alternatives (or additional modified alternatives) could meet BOEM's purpose and need, while reducing the negative environmental and socioeconomic impacts of the project. We recommend that the Final EIS for this project, as well as future Draft EIS and Final EIS documents for other wind projects, more clearly indicate that BOEM is not bound to considering approval only of projects that can produce a certain amount of electricity. BOEM should consider federal and state renewable energy targets and mandates as well as existing procurements when preparing an EIS and determining whether to approve a project. However, it should be made clearer that BOEM can approve a smaller project than what was proposed or procured. We suggest expanding on this to make it clear that the project will avoid risks to the health of marine ecosystems, ecologically and economically sustainable fisheries, and ocean habitats. BOEM should clearly acknowledge that if these risks cannot be avoided, they should be minimized, mitigated, and compensated for.	Under the Proposed Action, the proposed Project would be developed in two phases, with a combined maximum of 130 wind turbine generator (WTG) and electrical service platform (ESP) positions, all located within the SWDA. Phase 1, also known as the Park City Wind Project, would deliver at least approximately 804 megawatts (MW) and would be immediately southwest of Vineyard Wind 1. Phase 2, also known as the Commonwealth Wind Project, would deliver at least 1,232 MW and would be constructed southwest of Phase 1 within the remainder of the SWDA. Collectively, the proposed Project would generate at least 2,036 MW and up to 2,600 MW. The Project is planning for up to 130 WTG/ESP positions with a maximum of 129 WTGs. 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 Park City Wind for the New England Wind Project if those positions are not developed as part of the Vineyard Wind 1 Project.
0056-07	The emergence of this new industry has the potential to create thousands of local jobs, promote port infrastructure, and go a long way in realizing the Commonwealth and the Nation's climate and renewable energy goals	Thank you for your comment.
0061-03	The Town of Barnstable operates under federal and state mandates to do those things that will have measurable impact on reducing the use of fossil fuels. Wind power is being used successfully as part of the solution in a number of places. We need wind power to help us with this puzzle. The damage that has been done by disregard for the environmental impact has been done by Cape Codders as well as others. Now Cape Codders must be part of finding a best path forward. Putting wind power off limits is no solution.	Thank you for your comment.

Comment Number	Comment	Response
0062-01	Climate change is no longer just a threat – it is real. I see the impact of it every season on the Cape, with coastal erosion being of increasing concern...After reading up on the project, I believe the clean energy benefit derived from this project vastly outweighs any temporary impact to the Barnstable shoreline and beaches. Minor disruptions to quiet parking lots and streets during the winter months is a small price to pay for this important renewable energy project.	Thank you for your comment.
0064-01	The CCTC supports the development of innovative solutions to meet the anticipated energy needs of the Commonwealth of Massachusetts. One of the most promising of these solutions is wind energy. The New England Wind Project has the potential to meet these needs while advancing the state of wind energy technology.	Thank you for your comment.
0065-01	The time has come for our community to accept that a relatively minor, off-season disruption of the area is a small price to pay for the very tangible long-term benefits that renewable energy has to offer.	Thank you for your comment.
0067-01	Development of both phases of this project will make important contributions towards national and state offshore wind goals and the establishment of a local supply chain. Advancement of this project is in the declared public interests of the United States and the states of New England. Presidential Executive Order No. 14008, issued on January 27, 2021, states it is the policy of the United States to combat the climate crisis, reduce climate pollution in every sector of the economy, and spur well-paying jobs and economic growth especially through the development of clean energy technologies and infrastructure. Furthermore, the executive order specifically calls on the Secretary of the Interior to review permitting processes in offshore waters to increase renewable energy production in those waters, with the goal increasing offshore wind power in the United States to 30 GW and creating good jobs.	Thank you for your comment.
0067-03	Actions that delay project timelines must be avoided to the greatest extent possible. Project investments are ongoing and demand for materials, skilled labor, and critical equipment is dependent upon timely implementation. The Network urges BOEM to advance New England wind project on their timeline.	Thank you for your comment.
0067-07	The Business Network for Offshore Wind and its members strongly encourage BOEM to maximize the ability of the lease area to generate and transmit as much electricity as possible to support the goals, both national and regional, for renewable energy delivered to the grid.	Thank you for your comment.

Comment Number	Comment	Response
0067-10	actions by the Department of Interior are already driving substantial investment decisions. The Network closely tracks the market and found that public and private investors committed $2.2 billion in new funding in 2021, including commitments to develop nine major component facilities that will manufacture the foundations, towers, cables and blades of offshore wind turbines. In 2022, the market generated $5.44 billion in new lease revenues for the U.S. government, reflecting increased investor confidence in the U.S. market which will be crucial to a 1 The Business Network for Offshore Wind contributed to the report. 3 full build-out of the U.S. industry. Advancing New England Wind is crucial to maintaining this momentum.	Thank you for your comment.
0070-01	The promise of offshore wind goes beyond decarbonization. We are committed to an offshore wind industry that creates high-quality union jobs, builds projects with content manufactured in the U.S., delivers environmental justice and community benefits, and takes all action necessary to develop projects in an environmentally responsible manner by avoiding, minimizing and mitigating impacts to wildlife and natural resources.	Thank you for your comment.
0072-01	We support the New England Wind project for multiple reasons. First and foremost is the critical need to address climate change and reduce the region's reliance on fossil fuels. The project will generate enough clean, affordable power to reduce emissions by nearly four million tons. In addition, the more than 2 gigawatts of energy that will be produced is enough to power over one million households across New England and will significantly reduce consumer costs over time.	Thank you for your comment.
0073-01	In its move to reach the Country goal toward renewable energy, the Government is throwing money/tax incentives to voracious companies with few, and in Avangrid's case, no track record in Wind Power Projects. Tax dollars should be spent after issues have been studied by all sides and monies dispersed to companies based on proven results, efficiency, and SMART PLANNING.	Thank you for your comment.
0065-01	The time has come for our community to accept that a relatively minor, off-season disruption of the area is a small price to pay for the very tangible long-term benefits that renewable energy has to offer.	Thank you for your comment.
0073-01	In its move to reach the Country goal toward renewable energy, the Government is throwing money/tax incentives to voracious companies with few, and in Avangrid's case, no track record in Wind Power Projects. Tax dollars should be spent after issues have been studied by all sides and monies dispersed to companies based on proven results, efficiency, and SMART PLANNING.	Thank you for your comment.

Comment Number	Comment	Response
0073-02	In the Dowses Beach plan it is obvious that Avangrid has selected this landing site because it is the shortest distance between the wind farm and the Boston area power station and that they got a “sweet deal” from Barnstable.	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0073-07	The Town seems to have been swayed by the promise of “5 Million Dollars, up to 26 Million Dollars' ' over a 25 year period…”UP TO” does NOT mean it is a certainty. The reality could very well be that the Town receives 5 Million Dollars over 25 years, or nothing due to Avangrid’s poor financial ability to perform or repair/replace any disturbance to public and private property…hardly an incentive for the devastation of public land, wildlife, and loss of quality of life for residents. The Town of Barnstable has negotiated with an unproven LLC who is already trying to renegotiate their agreement with the State. Avangrid says the plan is not financially feasible. Is this an attempt to get more taxpayer money and tax incentives to finish their venture? The company is a start up with shaky financials.	Thank you for your comment.
0075-01	Avangrid, the developer of New England Wind, has proven it is a proactive community partner, and we look forward to continuing that relationship on this project. The Good Neighbor Agreement between the Town, the company, and local nonprofits is guiding our collaborations on mutually beneficial projects to combat the local effects of global climate change, enhance coastal resiliency, and protect local cultural and historic resources. The Town is confident this commitment and approach will continue.	Thank you for your comment.
0078-01	As one of the first large-scale offshore wind projects sited within the United States, New England Wind will deliver significant benefits to our districts by generating clean, reliable energy to our constituents, working towards climate resiliency goals, and cementing Massachusetts as a hub for the burgeoning offshore wind industry in the United States.	Thank you for your comment.
0078-02	The approval and construction of the New England Wind project will be a tangible and urgently needed demonstration of our commitment to a clean energy future. Indeed, New England Wind serves as a vital project to help achieve both the nation's and the New England region's ambitious climate resiliency goals.	Thank you for your comment.

Comment Number	Comment	Response
0079-03	Approving and implementing the New England Wind project will be a tangible demonstration of our commitment towards a clean energy future and serves as a vital project to help achieve both the nation's and New England region's ambitious climate resiliency goals. The project will generate more than 2,000 Megawatts of clean, affordable energy – enough to power over one million households and reduce emissions by nearly four million tons. That is the equivalent of taking more than 800,000 cars off the road annually. This critical power to the grid will significantly reduce the region's reliance on fossil fuels and will diversify the regional energy supply. Massachusetts has been a leader in clean energy policy, starting with the 2008 Global Warming Solutions Act which mandated carbon reductions in the Commonwealth, the 2016 Energy Diversity Act which seeks to grow renewable energy in Massachusetts energy mix, and most recently the 2022 Act Driving Clean Energy and Offshore Wind.	Thank you for your comment.
0080-01	Salem, an Environmental Justice community, home first to a coal-fired power plant and now a gas-fired power plant, knows well the health impacts of having fossil fuel polluters in our community. We are pleased that with the coming of Offshore Wind to our port we can now begin to imagine a cleaner and healthier future and ultimately the decommissioning of the gas plant earlier than 2050 (the negotiated decommissioning date).	Thank you for your comment.
0080-02	First and foremost is the critical need to address the climate crisis and reduce the region's reliance on fossil fuels. The project will generate enough clean, affordable power to reduce emissions by nearly four million tons. In addition, the more than 2 gigawatts of energy that will be produced is enough to power over one million households across New England, significantly reducing consumer costs over time while also lowering emissions with all the subsequent benefits.	Thank you for your comment.
0084-02	There are hundreds of miles of shoreline along MA, RI and CT. For Avangrid, is Dowses Beach the optimal location because it's public land and considerably easier to acquire than private land? There are other landing options for them to consider including buying private land.	Section 2 of the Draft EIS included the required alternative analysis to support the NEPA analysis and the Final EIS has been updated to include the preferred alternative.
0086-07	Why should Avangrid, a Spanish owned company and a "newbie" in the OSW industry, destroy this Cape Cod natural treasure simply to further its business interests, especially when there are other feasible MA landing alternatives available?	Thank you for your comment.

Comment Number	Comment	Response
0086-13	Many minerals to manufacture wind turbines are required such as "iron ore, aluminum and rare earth metals such as neodymium, terbium, and dysprosium." This is problematical because many of these materials are in areas outside the United Slates "where there are geopolitical tensions...Russia holds 22 percent of the world's rare earth metal reserves." Wind turbines use large amounts of copper, with copper and aluminum also necessary "to expand the electricity grid." How will the OSW developers address this challenge? It is one thing to say we will build OSW projects but the reality of making them come to life due to uncontrollable and unforeseeable world events is challenging indeed. In the United States, demand for copper has increased. President Biden states that his Administration's policy is "to improve air and water quality ... and to create more opportunities .. .in hard-hit communities, including rural communities." New Mexico is now in the midst of dealing with the harmful side effects of copper mining: air pollution and aquifer contamination. How can air pollution and water contamination be reconciled with President Biden's call to improve air and water quality?	Activities such as mining of critical minerals for the construction of wind turbines and other project components are not within the scope of the analysis or BOEM's authority. Analysis of impacts from mining activities in the United States would be conducted by the agency with applicable permitting authority for those activities. NEPA applies to major federal actions (in other words, activities undertaken or permitted by the United States government). Mining activities in other countries would not be subject to NEPA and any analysis of impacts from those activities would be covered by any laws or requirements those countries have.
0086-15	There is a narrative among environmentalists that wind is "cheaper, cleaner energy" but in truth, it is cheap only in the early transition phase. Fossil fuels are the basic support of our electricity needs and also stand in "for intermittent wind." Batteries are necessary to store the "excess electricity that's generated when there's too much wind...and releasing it later when there's not enough." An MIT research study shows "that battery storage costs need to fall by 90% to replace fossil fuels." The false narrative that renewable energy such as OSW is cheap and abundant has to be addressed: in fact, the cost is "$30.3 trillion of investment in clean energy and Infrastructure by 2030" as estimated by World Energy Outlook 2021. Adding to the rising costs would be the hard reality that any OSW construction, operations, maintenance or decommissioning would entail heavy usage of fossil fuels, whether by using boats, land vehicles, aircraft, or manufacturing of wind turbines, etc. President Biden calls for stopping fossil fuel subsidies so there is uncertainty on how much this will affect OSW finances It bears noting that the only operational OSW project is Rhode Island's Block Island Wind Farm. It had an upfront $300 million cost and the state gave an additional $20 million incentive alter National Grid complained about the effect of the project on its credit rating. Incentive payments are "common in Massachusetts• and "rely on significant financial support on tax revenues." The bad news is that despite the massive amount of dollars poured into the 5 turbine OSW project, only one (1) turbine is allegedly working.	Thank you for your comment.

Comment Number	Comment	Response
0087-01	First and foremost is the critical need to address climate change, reduce the region's reliance on fossil fuels and reduce carbon emissions. These projects will generate enough clean, affordable power to reduce emissions by nearly four million tons. In addition, the more than 2 gigawatts of energy that will be produced is enough to power over one million households across New England and will significantly reduce consumer costs over time.	Thank you for your comment.
0095-1-02	While other parts of the country may have other renewable energy resources, in the Northeast, the major resource we have, and the one we need to rely on, is offshore wind. Without offshore wind projects such as New England Wind, we simply can't hope to significantly reduce our carbon emissions and mitigate our contribution to climate change.	Thank you for your comment.
0095-4-01	the climate and health benefits of offshore wind is one of the big reasons that we support the development of this renewable energy resource. And analyses have shown that it's likely to provide around 50 percent of our energy supply by 2050 if we are to succeed in reaching our climate goals. We are really encouraged by the potential in offshore wind to help stabilize and decrease energy cost across our region, and also to increase reliability.	Thank you for your comment.
0097-3-01	The biggest threat to whales, and the ocean ecosystem that they live in, is climate change...Industrial development destroys ecosystems. More industrial development by the installation of hundreds of offshore wind turbines will not solve the problem of climate change...The production of materials, as well as manufacturing processes for wind turbines and associated infrastructure, or the extracted energy storage and transmission, are made possible by burning fossil fuels. To obtain the raw materials used in wind turbines, habitat is destroyed through open pit mining, mountain top removal. These are then transported to processing plants to be turned into (inaudible) parts. It will take a tremendous amount of energy, to find mining materials, transport and transform them through industrial processes like smelting to turn them into wind turbines, batteries, infrastructure and industrial machinery.	Activities such as mining of critical minerals for the construction of wind turbines and other project components are not within the scope of the analysis or BOEM's authority. Analysis of impacts from mining activities in the United States would be conducted by the agency with applicable permitting authority for those activities. NEPA applies to major federal actions (in other words, activities undertaken or permitted by the United States government). Mining activities in other countries would not be subject to NEPA and any analysis of impacts from those activities would be covered by any laws or requirements those countries have.
0097-3-02	I would also like to respectfully note that there are already 12 existing cable landings on our beloved beaches on Cape and the islands, including Martha's Vineyard in Nantucket. These ocean and onshore cable infrastructure projects are necessary for the integration of our islands into the electrical grid, and certainly not a new concept in terms of construction and implementation for our region, and our local communities on the Cape and islands.	Thank you for your comment.

Comment Number	Comment	Response
0097-4-01	All six towns on Martha's Vineyard have committed to being a hundred percent renewable in transportation, heating and electricity by 2040. Our island cannot reach these targets without offshore wind, and the New England Wind Project is critical in helping not only our island, but Massachusetts reach these goals. New England Wind is a critical transmission project for our Commonwealth, and the region, delivering an additional 2,000 megawatts of clean electricity into our grid, which will save rate payers money and contribute to the growth of a new industry here in New England and on the South Coast.	Thank you for your comment.
0097-4-02	I would also like to respectfully note that there are already 12 existing cable landings on our beloved beaches on Cape and the islands, including Martha's Vineyard in Nantucket. These ocean and onshore cable infrastructure projects are necessary for the integration of our islands into the electrical grid, and certainly not a new concept in terms of construction and implementation for our region, and our local communities on the Cape and islands.	Thank you for your comment.

O.5.2 Proposed Action and Alternatives

Table O.5-2: Responses to Comments on the Proposed Action and Alternatives

Comment Number	Comment	Response
0006-01	Ecological design elements should be incorporated into the offshore wind infrastructure, specifically for scour and cable protection where benthic habitat could be maximized. Using nature-based design elements significantly increases species settlement, richness, and abundance. Furthermore, nature-based design elements allow the structure to magnitude and frequency of maintenance leading to increased lifespan. Using ecological concrete as a mitigation measure and design alternative supports compliance with strict environmental regulations...all concrete materials should solely be fabricated from ecological concrete, including all cable and scour protection, in order to minimize impacts and create marine habitat opportunities.	Section 2.1.2 of the Draft EIS presented a discussion of scour protection alternatives and are also discussed in the New England Wind COP Vol I, Section 3.2.1.4.
0018-01	There are 100 reasons why this large-scale offshore wind project should not move forward, and some of those yes are environmental concerns. But moreso are the costs (upfront, maintenance, direct, indirect, hidden) of the project and the lack of a meaningful ROI on this project. The project will cost an extreme amount of funds, and already associated developers seem to convinced that it is not economically feasible.	Thank you for your comment.
0018-02	These large turbines and blades will likely need replacement or significant repairs in the 12-15 year timeframe, and any of that work will be extremely expensive and certainly not environmentally friendly. Where will the old blades go? From my understanding, they are not recyclable.	Factors such as how damaged and/or replaced project components are disposed of or recycled are not within the scope of the analysis or BOEM's authority.
0019-02	I want the developer to have the cheapest and easiest/fastest to construct cable landing option, and it’s clear that Dowses is that option.	Thank you for your comment.
0019-05	I spoke recently with one of the leaders of the opposition to the Dowses landing site...[who] mentioned above that the cable would be buried as shallow as 8 feet below the beach, leading to concerns about electromagnetic radiation exposure to beach goers. I was also told that there were legitimate concerns that, if the cable were to be routed under East Bay, the fresh water aquifer could be pierced. On the Feb 6th Zoom, experts from the BOEM stated that the estimated depth of the cable under the beach is 9 meters (nearly 30 feet) and that electromagnetic radiation amounts reaching the beach surface would be undetectable. I was also told that if cables are laid under East Bay, they would be well above the fresh water aquifer. If these statements are accurate, and I believe they are, the only potentially significant concerns I have heard re the cables coming into Dowses are ungrounded.	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a

Comment Number	Comment	Response
		paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach.
0029-01	Brattle Group conducted a study "Offshore Wind Transmission: an analysis of planning in New England and New York" which considered the "planned approach" similar to what BOEM calls "open access." Having various OSW projects share a single transmission line is advantageous due to lower costs for the OSW developers and also more beneficial to the marine life and habitat and coastal communities. This open access/planned approach is a superior approach to Avangrid's separate plan to land cables at estuarine Dowses Beach on Nantucket Sound...There is truly no reason to consider Dowses Beach as an OSW cable landing site when an intelligent open access/planned approach is available. BOEM writes that it has not considered the open access approach at this time and I ask "why not ask the OSW developer to do it for the next Draft EIS"?	Section 2.2 of the Draft EIS described those alternatives considered by not analyzed in detail. Developing a shared export cable corridor would not be technically or economically practicable because each other offshore wind project has distinct interconnection points to the electric power grid.
0029-11	A more suitable location if the "open access/planned approach" is not used, is the South Coast Variant (SCV), where New Bedford is welcoming OSW projects. The mayor has expressed much interest in the long term well-paying jobs for his constituents and the local community college has started a waterfront training facility for future OSW workers. Avangrid will base its CW office in New Bedford, making the location particularly feasible for CW. There will be advantages in fewer fossil fueling costs and proximity to the OSW turbines making for easier construction, operations and maintenance...New Bedford would truly benefit from the OSW jobs. New Bedford has a younger able-bodied population ideal for the OSW jobs and has proven expertise with handling industrial projects. The cutoff of fossil fuel subsidies would mean savings for CW as everything OSW is already there. Likewise, SCV is better for the environment because of shorter commutes for OSW workers, translating to less air pollution. Lastly, there is the important human element that the locals will feel affirmed that they are doing their active part to help the environment.	The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.
0029-12	HDD is cheaper, less precise and more prone to maintenance issues due to its flexible nature compared to microtunneling. Even a layperson will discern that there will be major adverse impacts to Dowses Beach.	To avoid impact natural resources, trenchless drilling/HDD is proposed which allows the least impact to the sensitive natural resources. As described in COP Vol I, Sections 3.3.1.8 and 4.3.1.8, horizontal directional drilling (HDD) is expected to be used at the Phase 1 and Phase 2 landfall site to avoid impacts of standard cable burial techniques in the nearshore region. Impact to surface ground and sediment disturbance are at the entry and exit points.
0029-13	CW is a multiyear project, barring any delays manmade or from acts of God, and the parking lot to be used as a staging area would be ugly, disruptive, noisy and dirty for years. Whether it is HDD or microtunneling, the impact to the citizens is major and adverse. BOEM	All staging areas used for the construction of the Project would be temporary and restored to its original state after completion. The actual onshore substation location has not been chosen yet, but it will not be located in the Dowses beach parking lot. More information on Project

Comment Number	Comment	Response
	has to accurately state the major adverse impacts to the coastal habitat, the marine life, the human quality of life, the wildlife and bird refuge, the aquifer's supply of drinking water, the air quality and the ADA rights of the disabled to the accessible fishing pier. BOEM cannot minimize the realities of this dirty fossil-fuel-heavy project masquerading as a green clean project. It has to revise the Draft EIS for accuracy.	construction and staging areas are addressed in NE Wind COP Vol. 1, Section 3.2.2 and 4.2.2.
0031-01	Estuarine Dowses Beach is the wrong location for CW. A more suitable site includes the South Coast, where New Bedford has Marine Commerce Terminal (MCT) and Foss Terminal - that will provide construction, maintenance, and other services to the offshore wind (OSW) industry. Avangrid's CW operations and maintenance will be based in New Bedford. An important factor is that MCT plans to expand its North Terminal to be capable of handling two separate future OSW installations. The proximity of these terminals to CW is ideal because there will be far less use of fossil fuels for boats and other staff vehicles traveling to do maintenance once the OSW projects are operational, making the South Coast location a cleaner, climate-friendly and lower carbon emission choice.	"The South Coast Variant is currently included as several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.
0034-04	Also, this project..... doesn't seem to consider take in the potential of rising oceans by placing the three vaults in the beach parking lot, where the rising ocean would cause an increase in the flooding of the parking lot (the parking lot currently floods a few times each year). Even the proposed canal bridge replacement project is looking to raise the height of the new bridges by 3 feet to keep the same clearance levels because of rising oceans.	Thank you for your comment.
0034-09	I strongly encourage you to require a planned approach for any of these wind projects. Two studies conducted by the Brattle Group compared two approaches for OSW transmission: the "generator lead line" and the "planned approach." The first has "project specific generator lead lines" and the second is "planned to minimize overall risks and costs." In the second "planned approach" benefits included lower impacts on coastal communities, marine life and marine environment. BOEM refers to "open access" transmission that will let various OSW farms "to connect to a single transmission line, potentially consolidating cabling systems, landing areas, and onshore infrastructure." Reducing total miles of cables to connect separate OSW farms, lessening "environmental impacts" of deep sea cables, and lowering "costs of development and operation" are some of the positives of this approach. A marine health and public health benefit of the planned approach is that the consolidation of individual cables into one transmission line "could be a significant move in mitigating cumulative electric and magnetic (EMF) effects across multiple OSW projects."	Section 2.2 of the Draft EIS described those alternatives considered by not analyzed in detail. Developing a shared export cable corridor would not be technically or economically practicable because each other offshore wind project has distinct interconnection points to the electric power grid.

Comment Number	Comment	Response
0034-11	As for alternative landing sites - Estuarine Dowses Beach is the wrong location for CW. A more suitable site includes the South Coast, where New Bedford has Marine Commerce Terminal (MCT) and Foss Terminal - that will provide construction, maintenance, and other services to the offshore wind (OSW) industry. Avangrid's CW operations and maintenance will be based in New Bedford. An important factor is that MCT plans to expand its North Terminal to be capable of handling two separate future OSW installations. The proximity of these terminals to CW is ideal because there will be far less use of fossil fuels for boats and other staff vehicles traveling to do maintenance once the OSW projects are operational, making the South Coast location a cleaner, climate-friendly and lower carbon emission choice.	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0035-01	I oppose landfall of the electrical lines at any beach, including Dowses Beach or Craigville Beach. There are several alternative landfall sites on the Cape that are quasi-industrial including Hyannis and Woods Hole. Two reasons.	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0036-02	This project, which is one of many to help fight climate change and supply other sources of renewable clean energy, doesn't seem to take in the potential of rising oceans by placing the three vaults in the beach parking lot, where the rising ocean would cause an increase in the flooding of the parking lot (the parking lot currently floods a few times each year). Even the proposed canal bridge replacement project (Sagamore and Bourne Bridges) is looking at raising the height of the new bridges by 3 feet to maintain the required 30 foot clearance levels due to potential rising oceans levels.	Thank you for your comment.
0037-03	[Dowses Beach landing site] There are alternative existing industrial sites for this project.	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables

Comment Number	Comment	Response
		within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0040-01	A "Planned Approach" to coordinate multiple landings in industrial areas, currently equipped for such projects, makes far more sense on many fronts.	Thank you for your comment.
0041-02	While reading through the different alternative's impacts I noticed that the "No Action" alternative refers to the instance when the New England Wind project isn't built, but the surrounding offshore wind farms are. I think this is deceiving. The "No Action" alternative in all documents should be a true no action, as in no offshore wind construction is approved and carried out.	The No Action Alternative consists of the current baseline conditions as influenced by past and ongoing activities and trends and serves as the baseline against which all action alternatives are evaluated. The Draft EIS presented a complete description and analysis of impacts from ongoing activities and trends (i.e., No Action Alternative) and impacts from the Proposed Action and action alternatives. The No Action Alternative provides a current baseline for analysis of impacts from the action alternatives. A separate analysis of the No Action Alternative when combined with future planned activities (i.e., cumulative actions) provides the future baseline as a basis for comparison of the cumulative impacts of the action alternatives.
0046-10	Comparisons to wind farms in Denmark are invalid. There are no hurricanes in Denmark. Denmark has had multiple problems with their cables. Horizontal drilling projects are usually done in remotes areas where there is adequate space for the equipment and it can be done without disruption of the surrounding area.	Section 2.2 of the Draft EIS addressed how WTGs are designed to sufficiently withstand severe storm events as well as how the HDD would be implemented. Chapter 3 of the Draft EIS addressed the potential impacts on resources areas during the HDD.
0048-03	BOEM states that many alternatives were considered. I presume these "alternatives" were submitted at least in part by the developer? Further study is needed. Please consider that there are plenty of viable and suitable alternative landings for these three high voltages (1200mw) cables that were not submitted by the developer and therefore not considered by BOEM, many outside of the town of Barnstable, in less environmentally sensitive areas.	Section 2.2 of the Draft EIS described those alternatives considered by not analyzed in detail.
0048-04	The best landing sites for these cables (short of an offshore "planned approach" proposed by the Brattle Group, which is ideal) are those that are closer to the users of the power, like Boston, Providence, Hartford, or the South Coast of Massachusetts. These locations have ample power plants and also decommissioned, existing, or underutilized power plants, all of which could be built up (for example, Acushnet) and would greatly reduce the onshore environmental and community damage and minimize the overall environmental damage...Fundamentally Cape Cod is not built to push power to the mainland. Per many electricity experts, it does not have	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land

Comment Number	Comment	Response
	the infrastructure and also would result in more instances of grid instability, brown-outs and higher costs to the end consumer.	transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion."
0048-05	The South Coast Variant, which is named in the Draft EIS, is a viable alternative that needs further study.	The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.
0049-05	they only work if the wind blows consistently between 15-50 mph—-that rarely happens—	Thank you for your comment.
0049-06	they can't withstand strong storms, hurricanes, tornadoes, thu def storms, lightning, downspouts —etc. All of which are predicted to increase . One turbine in N Texas even incinerated when struck by lightning n one fisherman almost got decapitated when a blade flew off.	Thank you for your comment.
0051-03	I would strongly encourage consideration of alternate venues, such as the existing power station along the cape canal, or the New Bedford area, neither of which is nearly as vulnerable to the potential long effects unique to Dowses Beach.	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0053-01	Dowses beach should not be abused by large commercial international conglomerate Oil Companies, such as Shell Oil Inc and its many "shell" LLC's. I demand that all of the Wind Farm on-shoring immediacy cease and desist until a well-engineered 'modular' transmission plan be put in place , such as the proposed 5 New England States 8.4 GW offshore model is completed.	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see

Comment Number	Comment	Response
		Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0055-03	If the developer uses this variant, we recommend that BOEM develop a supplement to the EIS so stakeholders can evaluate and provide comments on the proposal (page ES-11). Updates to the COP only are not sufficient for this purpose. As part of this supplemental EIS, we also recommend an evaluation of tradeoffs around different inter-array cable layouts given the exact design depends on the turbine and electrical service platform locations used (page 2-10). Generally, we recommend an inter-array layout that uses the least amount of cabling to minimize impacts to habitats and fisheries.	The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.
0055-04	The Draft EIS is unclear on how likely it is that the "representative inter-array cable layout" shown on Figure 2.1-3 will be used and whether certain areas within the lease are more likely be developed so this project can use the same offshore export cable route as Vineyard Wind 1.	The precise layout and amount of cable required for inter-array cabling is not known at this time and will be determined upon final engineering design of the WDA. The Final EIS has evaluated the maximum case amount of inter-array for potential impacts. The amount and length of inter-array cabling would not exceed the maximum design parameter as outlined in Appendix C.
0055-06	The alternatives are not well described, and it is not clear how the impacts to complex habitat would be minimized. Furthermore, Figures 4.1-8a through 4.1-8f of COP Volume 1 (page 225-230) show which export cables go into which corridors; however, it is not clear how these offshore export cable scenarios relate to Alternatives C-1 and C-2 in the Draft EIS. Similarly, Figures 3.5-3 through 3.5-7 of the Draft EIS show seafloor habitats within the offshore export cable corridor; however, it is confusing how these figures relate to Alternatives C-1 and C-2. We recommend one figure showing the seafloor habitats of both Alternative C sub-alternatives to fully understand the tradeoffs of constructing export cable corridors through the Muskeget Channel.	Phase 2 offshore export cable scenarios are provided in Final EIS Table 2.1-2 and the scenarios corresponding to each Alternatives are addressed in Table 2.1-1. A description of how each Alternative impacts benthic habitat is addressed in Final EIS Section 3.4.2.4.
0056-09	The NBPA continues to promote the responsible development of offshore wind and therefore a "No Action Alternative (ES.4.1 Alternative A)" is not a practicable substitute if the goal is to achieve the ambitious climate goals laid out by the federal and state governments.	Thank you for your comment.
0056-10	as the most profitable fishing port in the country representing an industry that employs over 7,000 people, we strongly support alternatives that minimizes habitat impact. In this case, we prefer ES.4.3 Alternative C - Habitat Impact Minimization Alternative that would minimize impacts on complex fisheries habitats.	Thank you for your comment.

Comment Number	Comment	Response
0057-03	Plans are to install industrial cables on this fragile piece of land. I understand these only last 20 years. Then what?	Decommissioning plans and timelines were discussed in Section 2 of the Draft EIS. The decommissioning approach is unchanged from the Draft EIS; therefore, no changes to the Final EIS were necessary. Further, additional NEPA analysis will be conducted prior to making a determination on the decommissioning application that needs to be submitted for purposes of authorizing decommissioning activities, including the methods to be used.
0060-03	nor has there been adequate consideration of alternative locations across numerous commercial areas to the north and south of Dowses. There are ZERO guarantees that our beloved Dowses Beach will not be destroyed and unable to recover from this attack. Accordingly, there is a solution. Avangrid must land their cables in an industrial area that can handle 1200mw of energy that will not pose a threat to Dowses.	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0067-05	While the Network appreciates environmental considerations undertaken during the process including impacts to habitat to fauna, it is clear that pursuing either Alternative C1 or C2 do not offer significant benefits over Alterative B and could lead to unneeded project delays as shown in the analysis. ....the Network encourages BOEM to think about holistic economic and environmental impacts when considering alternatives.	Thank you for your comment.
0067-06	The Network recommends that BOEM implement the goals of Alternative B, while recognizing, based on the valuable input that BOEM has received during the process, there may be ways to improve upon the project while ensuring the timeline continues to move forward without delay.	Thank you for your comment.
0070-03	We support BOEM's decision to provide a supplemental EIS (SEIS) if the developer chooses to use the South Coast Variant export cable corridor route, as they did not provide any environmental analysis of this route for the Draft EIS. Further, we note that the SEIS is even more important since the construction schedule for Phase 2 indicates that project construction would not begin until Q4 of 2028, when environmental, wildlife, and economic conditions may have significantly changed and technology and research may have improved. We recommend that BOEM revise the description of the affected environment section to incorporate an independent analysis of all species likely to occur in the Project Area, using relevant and up-to-date primary sources to support its analysis.	The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.

Comment Number	Comment	Response
0070-05	We appreciate the consideration of suction bucket foundations for Phase 2 of the project, but believe the analysis supporting the conclusion that a quieter foundation alternative for Phase 1 is infeasible is lacking and BOEM should provide a full analysis to the public.	As discussed in COP Vol I Section 4.2.1.2 and 4.2.3.3.3, jackets with suction buckets and bottom-frame foundations (with piles or suction buckets) are relatively immature technologies and have been used in offshore wind for only two small projects. While these technologies are not suitable for Phase 1 of this project from a risk and economic standpoint, an initial screening analysis has indicated that they may be feasible for Phase 2.
0070-08	Through the use of project labor agreements and community benefits agreements, offshore wind can create job transition opportunities for workers affected by this resource shift. The Final EIS should consider these impacts in its analysis of all alternatives, particularly the "No Action Alternative." Without offshore wind, it is likely that fossil fuel energy facilities would either come online or be kept online to meet future power demand in New England. Therefore, BOEM should reject the "No Action Alternative" because it would drive up pollution, prevent states from achieving mandated climate goals, increase energy costs, and threaten grid reliability by continuing our region's overreliance on fossil fuels for electricity generation.	Thank you for your comment.
0074-03	OSW in Nantucket Sound is not a good idea. There are other intelligent alternatives such as the “planned approach” which consolidates separate OSW projects into one deep ocean cable management.	Thank you for your comment.
0076-03	BOEM has not considered a reasonable range of Alternatives per NEPA. It has merely analyzed only those Alternatives that meet developer contracts and goals of full buildout, rather than considering prevention of interference with reasonable uses of the ocean or safety, as required under the Outer Continental Shelf Lands Act. No differing Project components or other Alternatives were analyzed, primarily because they did not meet the goals of the developer or were determined by "BOEM's technical experts" to be "technically infeasible" or "economically infeasible". We request that BOEM explain which technical experts make these determinations, the criteria or thresholds for determining "infeasibility", where BOEM sources its information about "infeasibility", and the process for assessing feasibility vs infeasibility.	Section 2 of the Draft EIS included the required alternative analysis to support the NEPA analysis and the Final EIS has been updated to include the preferred alternative.
0076-05	Alternative 4, the Transit Lane Alternative that was rejected by BOEM and is discussed on p. 2-36 of the Draft EIS as an Alternative Considered but Not Analyzed in Detail. BOEM maintains that this Alternative was negated by the developer's 1x1 nm layout that was recommended by the USCG MARIPARS, and because "wider routes could make the proposed Project economically infeasible". Again, we do not know what metrics BOEM has used to support this statement; please publicly disclose those metrics.	BOEM has consulted with USCG throughout the processes for identifying lease areas, reviewing individual COPs, and preparing this Draft EIS. Developers and applicants for projects in the RI/MA Lease Areas have agreed to develop (and have designed) all projects based on a uniform, orthogonal, 1- × 1-nautical-mile (1.15-mile) grid, as recommended by the USCG’s May 2020 Final Massachusetts and Rhode Island Port Access Route Study. Further, Chapter 2.2 of the Draft EIS indicates that an alternative that includes wider structure-free corridors throughout the

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		RI/MA Lease Areas, including the SWDA, was considered but not analyzed in detail and explains further why it was discounted.
0076-06	BOEM does not provide enough detailed information to differentiate between alternatives and associated impact producing factors, leading essentially to conclusions that all impacts are the generally the same. BOEM makes conclusions with no analysis to support its conclusions.	Chapter 3 of the Draft EIS provided resource-specific impact level definitions for each resource section, and the impacts of each alternative align with the appropriate impact level, as supported by the analysis. Impacts to each resource area are also summarized in the Final EIS Executive Summary, Table ES-3. Alternatives reduced impacts on many resources; however, they did not always result in a change to the resource's impact level conclusion. The minimization of impacts is identified and quantified where possible in the Final EIS.
0076-08	At the Draft EIS stage, the project boundaries are still uncertain. The developer/BOEM cannot differentiate which part of the lease will be Phase 1 or Phase 2 of the proposed Project, much less the boundary between Vineyard Wind 1 and New England Wind. BOEM must finalize the actual project boundaries, what on what lease assignments the proposed project would be located, finalize any potential necessary lease reassignments, and release those finalized boundaries in a future supplemental Draft EIS. BOEM cannot move forward on Project review when it has not finalized the boundaries of the proposed Project. This is especially true when the lease portion that would be potentially be reassigned to New England Wind would be coming from the Vineyard Wind 1 lease/Project which is subject to current litigation.	Under the Proposed Action, the proposed Project would be developed in two phases, with a combined maximum of 130 wind turbine generator (WTG) and electrical service platform (ESP) positions, all located within the SWDA. Phase 1, also known as the Park City Wind Project, would deliver at least approximately 804 megawatts (MW) and would be immediately southwest of Vineyard Wind 1. Phase 2, also known as the Commonwealth Wind Project, would deliver at least 1,232 MW and would be constructed southwest of Phase 1 within the remainder of the SWDA. Collectively, the proposed Project would generate at least 2,036 MW and up to 2,600 MW. The Project is planning for up to 130 WTG/ESP positions with a maximum of 129 WTGs. 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 Park City Wind for the New England Wind Project if those positions are not developed as part of the Vineyard Wind 1 Project.
0081-08	At a minimum, an additional alternative should be analyzed and compared against the design envelope of the project for which the Draft EIS has been prepared: a No Development Alternative. The No Action Alternative as presented should still be included in the Draft EIS, but a complimentary No Development Alternative should also be provided. Again, this demonstrates the need for a robust cumulative impact assessment and mitigation measures aimed to address cumulative impacts to understand the true impacts of OSW in the Atlantic.	Section 2 of the Draft EIS included the required alternative analysis to support the NEPA analysis and the Final EIS has been updated to include the preferred alternative.
0081-09	The Draft EIS should explicitly include alternatives for analysis that serve to mitigate the project's impacts to fishing, including...comments raised during scoping and in previous comment letters and those listed on RODA's website. The NE Wind Draft EIS includes alternatives intended to minimize habitat impacts from the export cable through the Muskeget Channel. While inclusion of these alternatives is appreciated, and we agree minimizing impacts to important habitat features is important; these do very little to protect the dependent recreational and commercial fishing	Section 2 of the Draft EIS included the required alternative analysis to support the NEPA analysis and the Final EIS has been updated to include the preferred alternative.

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	communities. RODA recommends other habitat features important to fisheries in the lease area be afforded similar protection as well.	
0081-12	RODA, and the fishing industry, are disappointed that Vineyard Wind (Copenhagen Infrastructure Partners and Avangrid Renewables, LLC) and New England Wind (Avangrid Renewables, LLC) are not honoring their commitment for a transit lane for navigation. In fact, it is even more disappointing that this was not even considered as an alternative in the Draft EIS preparation. The rationale for dismissal provided in the Draft EIS includes "wider routes could make the proposed Project economically infeasible because fewer WTGs would be installed" (Draft EIS p. 2-36). This is incomprehensible because at the time of the commitment to include a transit lane, Vineyard Wind planned to use 9.5 MW turbines, and yet the turbine capacity for Vineyard Wind 1 is 13 MW and for New England Wind is 13-16 MW. The fishing industry came to the table in good faith and worked with the offshore wind industry on an equitable solution to promote safety and protect navigation that is now being ignored.	Section 2.2 of the Draft EIS described those alternatives considered by not analyzed in detail. Developers and applicants for projects in the RI/MA Lease Areas have agreed to develop (and have designed) all projects based on a uniform, orthogonal, 1- × 1 nautical mile (1.15-mile) grid. USCG's May 2020 Final Massachusetts and Rhode Island Port Access Route Study recommended the same grid to maximize safety and navigation consistency (USCG 2020) and stated that 1- × 1 nautical mile (1.15 mile) spacing provides ample maneuvering space for typical fishing vessels expected in the proposed Project area. Addition of wider routes could make the proposed Project economically infeasible because fewer WTGs would be installed, with an accompanying reduction in the amount of electricity generated.
0081-15	The alternatives are poorly presented in the Draft EIS, and often require the reader to refer back to details only found in the COP. All pertinent information should be presented in the Draft EIS, including a basic schematic of cable export routes for the different alternatives and phases.	Section 2 of the Draft EIS included the required alternative analysis to support the NEPA analysis and the Final EIS has been updated to include the preferred alternative.
0081-16	It is confusing in the Draft EIS how each of the alternatives minimize impacts to habitat, and their relationship to anticipated (Vineyard Wind) and proposed (Mayflower Wind) export routes. At a minimum, there should be clear schematics in the Executive Summary with all the alternatives with legends consistent with the language used in the Draft EIS, and the difference in impacts from each alternative. It is nearly impossible to understand these seemingly basic components as presented in the Draft EIS.	Chapter 3 of the Draft EIS provided resource-specific impact level definitions for each resource section, and the impacts of each alternative align with the appropriate impact level, as supported by the analysis. Impacts to each resource area are also summarized in the Final EIS Executive Summary, Table ES-3. Alternatives reduced impacts on many resources; however, they did not always result in a change to the resource's impact level conclusion. The minimization of impacts is identified and quantified where possible in the Final EIS.
0081-20	BOEM's draft analyses recognize the potentially major impacts to fishing, marine mammals, and navigation of the proposed projects and their respective alternatives. Yet, not all mitigation proposals offered by the fishing industry were evaluated as alternatives in the Draft EIS.	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

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		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).
0081-22	We recommend utilizing larger capacity turbines to make the geologic footprint, in terms of WTGs deployed, smaller. This, in turn, could assist in the avoidance and/or minimization of impacts resulting from the project. This alternative should be considered and made clear to the public as turbine size is fundamental to the number of turbines that will be used in a project area.	Alternative 8 would have required the largest available WTGs to minimize the number of foundations constructed to meet the proposed Project capacity, minimize impacts on marine habitat and resources, and reduce navigation and other space-use concerns. It was determined that there is no scientific evidence that this alternative would not avoid or substantially lessen one or more significant environmental impacts of the proposed project and would not be economically feasible or practicable. BOEM will ensure that all issues and concerns raised regarding Atlantic COD and North Atlantic right whales are fully addressed with the preferred alternative.
0082-01	Rather than provide regulatory approval of the "generator lead line" approach being proposed by Avangrid in the Draft EIS, we ask BOEM to reject this project and require Avangrid and all wind farm developers to utilize a planned approach as outlined in the attached Grid Innovation Program Concept Paper – Joint State Innovation Partnership for Offshore Wind, dated January 13, 2023 (see Attachment 1). This Concept Paper was jointly submitted to the U.S. Department of Energy by the Connecticut Department of Energy and Environmental Protection, the Maine Governor's Energy Office, the Massachusetts Department of Energy Resources and the Rhode Island Office of Energy Resources, with the support of the States of New Hampshire and Vermont.	Thank you for your comment.
0082-04	The siting of this industrial scale project and three high-capacity electric cables on/near Dowses Beach is beyond comprehension. This local, beloved beach is at the heart of the Village of Osterville and is used year-round by citizens from all of Barnstable's seven villages. Dowses Beach, an area that is frequently subject to flooding during storms and extreme high tides, supports a fragile estuarine environment, is a significant wildlife habitat, and provides a handicap accessible fishing pier for disabled and mobility-restricted members of our community.	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline

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		erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach.
0083-01	Require a supplemental EIS (SEIS) if the developer selects the South Coast Variant export cable corridor route. We support BOEM's decision that, should the South Coast Variant be selected, a SEIS would be needed, as New England Wind did not provide any environmental analysis of this route for the Draft EIS.	The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.
0083-08	Because BOEM has not provided any environmental analysis of the potential South Coast Variant route in the Draft EIS, we agree that a supplemental analysis of the South Coast Variant would be necessary... As discussed, a number of uncertainties around the Project, in particular Phase 2 (e.g., the potential use of the South Coast Variant requiring additional analysis, potential renegotiation of the PPA, and timing of cable and WTG installation) could lead to meaningful changes.	The South Coast Variant is currently included as one of several possible cable route scenarios for Phase 2 of the Project; however, the Project would only use the South Coast Variant if technical, logistical, grid interconnection, or other unforeseen issues arise during the COP review and engineering processes. More information on the South Coast Variant and what factors would be considered prior to choosing this cable route are discussed in COP Vol I, Section 4.1.3.3. If the South Coast Variant is chosen, additional NEPA analyses and COP modifications would be needed to evaluate the impacts of installing export cables through this area.
0083-109	[F]or the purposes of mitigating impacts to benthic resources, finfish, invertebrates, and EFH, we recommend that BOEM select Alternative C: Habitat Impact Minimization Alternative (Habitat Alternative), and specifically Alternative C-1, which would avoid siting the OECC in the western portion of Muskeget Channel. The western area of Muskeget Channel contains hard bottom, complex habitat that is important for a number of finfish and invertebrates species. Because Alternative C-1 would avoid, minimize, and mitigate impacts to such habitats in Muskeget Channel more so than the other alternatives, BOEM should select this option. We also urge BOEM to require New England Wind to undertake several mitigation and monitoring measures identified in the Draft EIS.	Thank you for your comment.
0083-115	Alternative C-1, which would avoid siting the OECC in the western portion of Muskeget Channel, would result in reduced impacts to complex benthic habitats, the EFH that overlap with such areas, and finfish, and we urge BOEM to select this alternative to mitigate impacts to benthic resources, finfish, invertebrates, and EFH... The fact that complex habitat areas–like Muskeget Channel–may take a decade or longer to recover from offshore wind development activities provides additional justification	Thank you for your comment.

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	for selecting Alternative C-1. Moreover, because the eastern Muskeget Channel contains a variety of habitat types, including soft- bottom habitats, siting the OECC exclusively in the eastern portion of Muskeget Channel under Alternative C-1 avoids impacts to complex habitats more than Alternative C-2, which would still site part of the OECC in the western Muskeget Channel. Accordingly, BOEM should select Alternative C-1.	
0083-117	New England Wind proposes to avoid installing the OECC in sensitive and important habitats, including eelgrass beds and hard-bottom habitats, if feasible. While Alternative C-1 would reduce impacts to complex benthic habitats in Muskeget Channel, this alternative would still result in construction occurring in complex habitats in some areas of the channel. To further reduce impacts, BOEM should require New England Wind to employ micro-routing of cables to avoid siting in complex benthic habitats and other sensitive habitat areas.	Although both Alternatives C-1 and C-2 will result in impacts to complex benthic habitats, as noted in Final EIS Section 3.4.2.4, Alternative C-1 would result in less impacts to complex benthic habitats. Microrouting the cable around complex habitat may reduce the amount of impacts; however, this is likely not possible due to the additional length of cable needed and the fact that these cables would be fabricated prior to establishing an alternative cable route.
0083-127	We appreciate the consideration of suction bucket foundations for Phase 2 of the project. However, the Draft EIS's analysis of the feasibility of using a quieter foundation alternative for Phase 1 is cursory. It states that, "The applicant determined that the Phase 2 foundation types suggested by commenters were not suitable for Phase 1 due to local site conditions, as well as technical and supply chain considerations," and then determines, without analysis, that, "The suggested alternative [quieter foundations] would, therefore, be technically and economically infeasible and impractical." For New England Wind... BOEM should provide the analysis it uses to determine the feasibility of various turbine technologies to the public.	As discussed in COP Vol I Section 4.2.1.2 and 4.2.3.3.3, jackets with suction buckets and bottom-frame foundations (with piles or suction buckets) are relatively immature technologies and have been used in offshore wind for only two small projects. While these technologies are not suitable for Phase 1 of this project from a risk and economic standpoint, an initial screening analysis has indicated that they may be feasible for Phase 2.
0084-04	Find another location that can truly withstand an industrial type installation - one that does not potentially wreak havoc on a fragile ecosystem. These alternative locations do exist. Please find them.	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0085-03	The transit lane alternative that was supported by the commercial fishing industry that was rejected by BOEM must be re-analyzed in light of the 2022 National Academy of Sciences report "Wind Turbine Generator	Section 2.2 of the Draft EIS described those alternatives considered by not analyzed in detail. Developers and applicants for projects in the RI/MA Lease Areas have agreed to develop (and have designed) all projects based

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	Impacts to Marine Vessel Radar," review of radar interference. As noted on page 12 of the report, "WTGs will impact visual navigation by hiding small contacts. If transiting through the wind farm during periods of restricted visibility, the mariner's reliance on marine vessel radar (MVR) increases. Therefore, knowing the impacts WTGs have on MVR and possible mitigating solutions is critical to ensuring that navigation can continue by the safest means possible. With hub heights exceeding 100 m, and structures predominantly made of steel, 4 WTGs are large installations that can have significant electromagnetic reflectivity. As a result, WTGs installed within the line of sight of a radar system can cause clutter and interference, in some cases detrimentally impacting radar performance...Furthermore, rotating blades can have large and numerous Doppler returns due to their motion relative to the radar system. The installation of WTGs across the U.S. OCS therefore poses potential conflicts with a number of radar missions supporting air traffic control, weather forecasting, homeland security, national defense, maritime commerce, and other activities relying on this technology for surveillance, navigation, and situational awareness."1 In light of the NAS report, BOEM must re-analyze the Transit Lane Alternative again, with at least 4-mile wide corridors so as to protect fishermen and other mariners in a way that radar can be effectively used in all forms of weather must be reconsidered.	on a uniform, orthogonal, 1- × 1 nautical mile (1.15-mile) grid. USCG's May 2020 Final Massachusetts and Rhode Island Port Access Route Study recommended the same grid to maximize safety and navigation consistency (USCG 2020) and stated that 1- × 1 nautical mile (1.15 mile) spacing provides ample maneuvering space for typical fishing vessels expected in the proposed Project area. Addition of wider routes could make the proposed Project economically infeasible because fewer WTGs would be installed, with an accompanying reduction in the amount of electricity generated.
0086-02	A more suitable site includes the South Coast, where New Bedford has Marine Commerce Terminal (MCT) and Foss Terminal • that will provide construction, maintenance and other services to the offshore wind (OSW) industry. Avangrid's CW operations and maintenance will be based in New Bedford. An important factor is that MCT plans to expand its North Terminal to be capable of handling two separate future OSW installations. The proximity of these terminals to CW is ideal because there will be far less use or fossil fuels for boats and other staff vehicles traveling to do maintenance once the OSW projects are operational, making the South Coast location a cleaner, climate-friendly and lower carbon emission choice.	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0086-18	Two studies conducted by the Brattle Group compared two approaches for OSW transmission: the "generator lead line" and the "planned approach." The first has "project specific generator lead lines" and the second is "planned to minimize overall risks and costs." In the second "planned approach" benefits included lower impacts on coastal communities, marine life and marine environment. BOEM refers to "open access" transmission that will let various OSW farms "to connect to a single transmission line,	Section 2.2 of the Draft EIS described those alternatives considered by not analyzed in detail. Developing a shared export cable corridor would not be technically or economically practicable because each other offshore wind project has distinct interconnection points to the electric power grid. However, several of the Project alternatives could utilize the Eastern Muskeget OECC which is where the Vineyard Wind 1 Project export cables have been installed. If these Alternatives and associated cable route

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	potentially consolidating cabling systems, landing areas, and onshore infrastructure." Reducing total miles of cables to connect separate OSW farms, lessening "environmental impacts of deep sea cables, and lowering costs of development and operation• are some of the positives of this approach. A marine health and public health benefit of the planned approach is that the consolidation of individual cables into one transmission line "could be a significant move in mitigating cumulative electric and magnetic (EMF) effects across multiple OSW projects." BOEM needs to seriously consider this environment-friendly, more cost effective, and intelligent planned/open access approach. This will take cooperation among OSW developers but BOEM's federal mandate is Ocean Energy Management. This means that BOEM has a leadership responsibility role and not simply accept whatever OSW developers place in front of it. BOEM must encourage and compel various separate OSW entities with their separate business interests to come together for the common good of the ocean and the environment. Destroying the ocean and industrializing it to depletion and death is wrong.	scenarios are chosen, Dowses Beach or Wianno Ave. would still be possible Phase 2 export cable landfall sites.
0096-1-01	The six New England states submitted two proposals to the U.S. Department of Energy, one of which relates directly to the proposal currently before BOEM and advocates coordinated offshore transmission of ocean-based wind power...I'm going to cite FOA 2740 at netl.doc.gov as the source for the proposal that was filed on Monday...As BOEM is well aware, the planned approach would connect turbines to an ocean-based transmissions system that would involve a landing at two and possibly three appropriate and grid proximate locations on the Massachusetts coast. This opposed to potentially 18 cable landings in addition to the two underway and the five under -- under review on the beaches of Cape Cod. The fact of the matter is that the unplanned approach as compared to the planned approach is far more costly and will result in greater instability of the grid in terms of overloads, brownouts, and outright failures...We ask that BOEM reject the proponent's plan to land cables at Dowses Beach, but also to consider the promotion of a planned approach for electrical transmission from its OCS lease areas south of Martha's Vineyard.	Section 2.2 of the Draft EIS described those alternatives considered by not analyzed in detail. Developing a shared export cable corridor would not be technically or economically practicable because each other offshore wind project has distinct interconnection points to the electric power grid.

O.5.3 Benthic Resources

Table O.5-3: Responses to Comments on Benthic Resources

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0028-02	Since the proposed routing of the offshore cable closely aligns with the extensively analyzed routing for Vineyard Wind, it is assumed that minimal and temporary impacts to the seabed and habitat are to be expected, which is supported by BOEM's analysis in the Draft EIS.	Section 3.4.2.3 of the Draft EIS discussed the impacts to benthic resources from the Proposed Action.
0055-18	The Draft EIS indicates that hydrodynamic effects and disturbances on benthic resources will result from the presence of human-made structures in the water column; however, we are concerned that their extent may be underestimated. The expected impacts are likely more than "undetectable to small, localized, and to vary seasonally" (page 3.4-12). For example, the presence of structures could impact the structure of the Mid-Atlantic Cold Pool, causing changes in temperature, mixing, larval transport of important commercial and recreational fish species (e.g., sea scallops), and temperature corridors used for migration for multiple important fishery species. This is an area of ongoing research. The Final EIS should clearly document what is known about potential impacts to the Cold Pool and resulting potential impacts to marine species and fisheries. The Final EIS should acknowledge data gaps and ongoing research and should fully consider potential impacts resulting from this project, as well as cumulative impacts from all planned wind energy projects throughout the region.	Section 3.6.2.1 of the Draft EIS presented a discussion on the presence of Project structures and the associated impact analysis, particularly their potential impact on the existing cold pool feature in the lease area.
0074-01	BOEM minimizes these major adverse impacts by stating that it will affect a small geographical area and is "discontinuous in nature." BOEM vaguely refers to "a relatively limited extent of the geographic analysis area." How limited is limited? BOEM has to be more precise about the size of this geographical area. It appears that BOEM minimizes the negative impacts on benthic resources to allow OSW activity in Nantucket Sound.	Appendix D of the Draft EIS stated that the geographic analysis area for Benthic Resources was a 10-mile radius around the SWDA and the OECC. The quantity of benthic habitat impacted by the Project's Proposed Action was addressed in Section 3.4 of the Draft EIS. The cumulative impact sections address the larger area, including adjacent proposed or planned wind farms and ongoing activities.
0074-04	BOEM states that "sediment disturbance would be temporary." That is vague and unscientific as it does not have any specific basis for making that statement. Temporary to whom? For a benthic organism living in that particular area where the "sediment disturbance" occurred, that means being uprooted from its benthic habitat, separated and/or displaced from its benthic community of other benthic organisms, even be mortally affected. How can mortality of a benthic organism be considered "temporary"? That would be considered a permanent and major adverse impact.	Despite unavoidable mortality, injury/damage, or displacement of benthic invertebrate organisms, the area affected by the Project would be minimal when compared to the Geographic Analysis Area. No population-level impacts are expected, and disturbed areas overtime would be recolonized by neighboring benthic communities. Also, most benthic resources in the geographic analysis area are adapted to turbidity and periodic sediment deposition that occurs naturally. More information on the Project's potential impacts to benthic resources are addressed in Section 3.4.2 of the Final EIS.
0081-36	Qualitative conclusions of soft to hard substrate as beneficial, as this is generally believed to create habitat, fails to discuss impacts to species reliant on soft sediments. It is unclear whether this newly created, harder	Section 3.4.2.1 of the Final EIS has been updated to include references to new research and more discussion around potential adverse impacts associated with changing soft bottom benthic habitat to hard bottom.

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	habitat will give other species a competitive advantage over species that prefer, or require soft bottom for their life cycle.	
0081-37	The primary concern regarding cables remaining in the water is the dynamic nature of the seabed – scour protection is required because sediment moves and therefore cables can become uncovered. It is unclear who is responsible for uncovered cables left in the ocean after decommissioning. These cables are a major safety concern for fishing vessels operating mobile bottom tending gear as they can hang-up on cables.	Decommissioning plans and timelines were discussed in Section 2 of the Draft EIS. The decommissioning approach is unchanged from the Draft EIS; therefore, no changes to the Final EIS were necessary. Further, additional NEPA analysis will be conducted prior to making a determination on the decommissioning application that needs to be submitted for purposes of authorizing decommissioning activities, including the methods to be used.
0083-06	We recommend that BOEM... Select Alternative C-1, to avoid offshore export cable corridor siting in the western portion of the Muskeget Channel, an area of ecologically important hard bottom, complex habitat.	Thank you for your comment.
0083-35	Because both the Block Island Study and the New England Wind Draft EIS itself find the potential for long-term to permanent impacts on sensitive benthic habitats from offshore wind development, BOEM should include more justification in the New England Wind Final EIS for why it expects that these potential impacts to sensitive benthic habitats will not result in any population-level impacts to the species that rely on them, and particularly to overfished species like Atlantic cod. More specifically, because the OECC will traverse juvenile Atlantic cod HAPC, as well as possible cod spawning grounds in the complex habitats of Muskeget Channel, BOEM should analyze whether the potential long-term to permanent impacts from cable emplacement and anchoring activities in the OECC could lead to population-level impacts on Atlantic cod.	Section 3.4 of the Final EIS includes recent studies on Atlantic cod.
0083-40	The purpose of the Habitat Management Alternatives is to minimize impacts on complex fisheries habitats by limiting the potential OECC construction scenarios. Alternative C-1, the Western Muskeget Variant Avoidance alternative, would avoid routing the OECC within the western Muskeget Channel altogether and avoid a crossing of a proposed OECC route for the SouthCoast Wind project within the western Muskeget Channel. Conversely, Alternative C-2, the Eastern Muskeget Route Minimization alternative, would minimize, to the degree practicable, use of the eastern Muskeget Channel route and maximize use of the western Muskeget Channel route (and/or the South Coast Variant, which BOEM notes would require a Supplemental Environmental Impact Statement prior to selection). BOEM finds that either Alternative C-1 or C-2 would reduce or avoid impacts on benthic resources when compared to Alternative B. However, according to BOEM, the western portion of Muskeget contains more complex habitat than the eastern portion, which contains a wider variety of habitat types. Accordingly, by avoiding siting the OECC in the western Muskeget Channel, Alternative C-1 would impact less complex benthic habitat than either the Proposed Action or	Thank you for your comment.

Comment Number	Comment	Response
	Alternative C-2. Alternative C-1 may also result in less impacts on sensitive habitats than Alternative C-2 because more of the Alternative C-1 OECC route would be collocated with the Vineyard Wind 1 offshore export cable corridor than the Alternative C-2 route.	
0083-111	In general, benthic habitats can be classified based on their level of physical complexity, ranging from relatively simple habitats to more complex habitats... [M]ore complex habitats provide a heterogeneous variety of hard surfaces and fine material that provide habitat for many different species. Given their relative structural permanence and complexity, glacial moraines create a unique bottom topography, which enables a high level of biodiversity... [T]he Draft EIS denotes the substrate types in the areas of New England Wind and the OECC as either (1) hard/complex bottom or (2) soft, low complexity bottom habitats... [N]o hard-bottom habitat has been identified in the planned New England Wind area. As for the OECC, although most areas are soft-bottom, there is significant hard-bottom habitat coverage in the Musket Channel area of the OECC. In fact, sections of the OECC in the vicinity of Muskeget Channel contain special, sensitive, or unique resources that consist of "hard/complex bottom," as defined in the Massachusetts Ocean Management Plan (MA Ocean Plan). While most of the complex habitats in Muskeget Channel consist of cobble and gravel substrate, isolated boulders are also found in the area. The New England Wind COP finds that the cobble and pebble substrates in the Muskeget Channel area of the OECC correspond to the "most productive habitats" of the OECC, "with the highest number of invertebrate species and observations of fish." In general, complex, hard bottom habitat provides EFH for a number of species, including both juvenile and adult Atlantic cod. Offshore, both juvenile and adult cod prefer structurally complex hard bottom habitats comprising mostly pebbles, cobble, and boulders. Cobble substrate is critical for the survival of juvenile cod because it helps them avoid predators. Studies have also shown that hard bottom habitats are important for cod reproduction. Atlantic cod demonstrate spawning site fidelity, meaning they return to the same bathymetric locations year-after-year to spawn. Boulders and cobbles, which are more prevalent in complex habitats, also provide EFH for other species such as black sea bass juveniles and adults, Atlantic sea scallop larvae, ocean pout and herring eggs, as well as certain invertebrates that attach to hard surfaces, including mussels, oysters, starfish, sea urchin, etc.	Expected recovery rates are expected to vary based on the available literature, with complex or gravel habitats taking longer to recover. Text has been added to address this under anchoring and gear utilization in Sections 3.4.2.1 and 3.4.2.3. It should be noted that recovery rates in these habitats are based on commercial fishing, mostly from scallop dredge. Scallop dredging activities are different from the Proposed cable laying activities planned within Muskeget Channel or other complex habitats of the OECC.
0083-112	In several instances, the Draft EIS observes that the presence of WTG structures, anchoring, and cable emplacement can result in long-term impacts to benthic habitats and EFH. For example, the Draft EIS explains that where anchoring results in the degradation of sensitive habitats, such	The installation of foundations, scour protection, and cable protection could cause permanent to long-term impacts to sensitive benthic habitats such as eelgrass beds, but will only be measurable on a site-specific level and will not have population-level impacts on benthic species or resources.

Comment Number	Comment	Response
	as eelgrass beds and hard-bottom habitats, impacts could be long-term to permanent. Similarly, it states that where cable routes intersect with eelgrass or hard-bottom habitats, the impacts may be long-term to permanent. It also observes that where anchoring degrades sensitive EFH, the impacts can be long-term to permanent. The analysis in the New England Wind Draft EIS on potential long-term impacts to benthic habitats from offshore wind development is consistent with what has been observed at the Block Island Wind Farm. In a study of the Block Island Wind Farm, non-complex habitats, consisting mainly of sand and mud, demonstrated a high rate of recovery. Conversely, complex habitats have been shown to take longer to recover from offshore wind construction. In the Block Island study, zero percent of complex habitat areas, containing mainly cobbles and pebbles, had completely recovered from baseline conditions after the wind farm had been in operation for nearly two years. Overall, the New England Wind Draft EIS concludes that the impacts to benthic habitats from cable emplacement and anchoring will be minor if sensitive habitats are avoided and moderate if sensitive habitats are not avoided, and that complex habitats are expected to recover completely from cable emplacement. The conclusion that complex habitats will recover completely is inconsistent with the findings in the Draft EIS that offshore wind activities may result in long-term or permanent impacts.	Activities such as cable emplacement and anchoring may have long-term impacts on sensitive benthic habitats, but these habitats will recover completely based on the best available science. It should also be noted that sensitive and complex benthic habitats such as eelgrass will be avoided to the best of the Project's ability during the construction and installation phases of the Project. More information on the Project's potential impacts to benthic resources are addressed in Final EIS Section 3.4.2.3 under Anchoring and gear utilization.
0086-12	Stating that "Although sediment transport beyond ten miles is possible, sediment transport...would likely be limited to a smaller spatial scale than 10 miles" is vague, unscientific and must be addressed by BOEM before any future OSW discussions pertaining to [New England Wind] and Dowses Beach.	More details on the Project's sediment transport modeling is provided in COP Volume III, Appendix III-A.

O.5.4 Coastal Habitats and Fauna

Table O.5-4: Responses to Comments on Coastal Habitat and Fauna

Comment Number	Comment	Response
0023-001	the proponent has engaged in what we believe are inaccurate representations in the required permitting filings for the project. Among these are self-serving depictions of the ecology present at the greater Dowses environment. Figure 5.2-7 in Volume II of the COP indicates that three areas of complex habitat exist along the OECC. Two of these are well offshore in the Muskeget cut. The third encompasses the entire nearshore length of the barrier spit known as Dowses Beach and continues across the East Bay channel that is part of the associated estuarine environment. The map's misleading inset completely eliminates the greater Dowses beach and embayment from view, showing instead only a portion of the designated complex habitat and beaches further to the east. Additionally, the "possible" eel grass bed on the western edge of Dowses beach, also indicated in the COP, is given little consideration in either the COP or the Draft EIS.	Appendix A of the Final EIS includes a complete list of permits that will be required for the Project along with the status of the permits. Section 3.5 of the Draft EIS stated that impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach. The onshore export cable crossing of East Bay, if used, would use microtunneling, HDD, or other trenchless installation methods to pass beneath the bay and avoid impacts on coastal habitats. Neither approach to the Phase 2 landfall sites would pass near Spindle Rock's hard-bottom habitat and eelgrass bed. Eelgrass locations will be avoided by New England Wind activities based on the planned routes, with over 650 feet to the west of the eelgrass bed at Spindle Rock and the possible Phase 2 cable approximately 3,000 feet from the eelgrass near the Dowses Beach landfall. Vessel anchors will be required to avoid these eelgrass beds as long as it does not compromise vessel's safety.
0023-004	While the greater Dowses Beach area is recognized as a watershed estuary, as designated by the Massachusetts Estuary Project (2006), it is nowhere described as an estuarine environment in the COP, and, as a result, does not appear to be considered as such in the Draft EIS. The greater Dowses area differs significantly from the proposed landing areas for Phase 1, Barnstable's Craigville and Covell's beaches, which are straight line coastal beaches, neither of which are barrier spits fronting embayment's critical to local wildlife, featuring a large public mooring field, or equipped with a pier providing handicapped access to the waterfront.	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach.
0029-07	President John F. Kennedy's lasting gift to humanity is creating the Cape Cod National Seashore. On a smaller scale but no less meaningful, protecting estuarine Dowses Beach and the Nantucket Sound marine environment would be a step in the right direction. Aquatic biodiversity can only happen if the aquatic habitat itself is protected. BOEM must give importance to the state of Nantucket Sound and to its essential role in	Thank you for your comment.

Comment Number	Comment	Response
	biodiversity...Given the large number of endangered fauna in Nantucket Sound, BOEM must seriously take into account the major adverse impacts to biodiversity. Aquatic biodiversity will suffer, marine animals will die. CW must not be allowed to destroy a thriving coastal community and should reconsider its poor choice of its cable landing location.	
0029-08	There is a fragile Causeway on Dowses Beach that separates East Bay from Phinney's Bay. BOEM vaguely mentions a "paved area," but does this "paved area" actually refer to the Dowses Beach Causeway? BOEM states that "Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach. The onshore export cable crossing of East Bay, if used, would use microtunneling , HDD, or other trenchless installation methods to pass beneath the bay and avoid impacts on coastal habitats." How is this impact-free approach on "coastal habitats and fauna" even possible? By their very nature, any of these aforementioned installation methods require some digging, using heavy machinery, causing air, noise and water pollution, disturbing the fin fishes and shellfish in their natural marine habitat, disrupting the peaceful existence of the wildlife, piping plovers, ospreys who call Dowses Beach home.	As described in Sections 3.3.1.8 and 4.3.1.8 of COP Volume I, horizontal directional drilling (HDD) is expected to be used at the Phase 1 and Phase 2 landfall site to avoid impacts of standard cable burial techniques in the nearshore region. HDD drilling is least invasive of all methods such as open trenching. Impact to surface ground and sediment disturbance are at the entry and exit points. See Section 3.3.1.8 for a description of HDD The engineering trajectory shows the HDD will be passing at a depth of 9m (30ft) below the surface. COP Vol III 4.3.1.8.1 Page 4-98
0031-04	Estuarine Dowses Beach is a Cape Cod natural treasure, home to the endangered piping plover, spawning habitat for fin fishes, a wildlife and sea bird refuge, environmental home of horseshoe crabs, oysters and other shellfish	Thank you for your comment.
0031-06	Landing OSW cables on estuarine Dowses Beach and using the parking lot as a convenient staging area for Avangrid's multiyear industrial heavy machinery project would destroy the fragile natural beauty of Dowses Beach	The ocean to land transition at the Dowses Beach Landfall Site will be made using HDD, which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion. COP Vol III 2.3.1.6
0033-01	We understand that Avangrid has alternatives that are better for the environment and would not compromise the fragile ecology that is Dowses Beach and East Bay.	Thank you for your comment.
0034-01	The Greater Dowses Beach area... will be impacted by this project, includes Dowses Beach, Phinney's Bay and East Bay and a narrow causeway that allows access to the beach...It is a barrier spit and a fragile coastal estuary...provides a wildlife refuge for migratory and resident birds, including endangered species...that depend on this unique environment including a nesting area for piping plovers.	Thank you for your comment.
0035-02	[opposition to Dowses Beach landing site due to] the potential damage and disruption to the natural habitat and fragile ecosystems.	Thank you for your comment.
0036-01	The disruption to the Covell beach and the entire Hyannis area by the Vineyard Wind Project is a living example of the disruption and	Thank you for your comment.

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	destruction these projects create. They never stay on schedule and never restore the sites areas to their original habitat.	
0039-02	I am strongly opposed to the "Phase 2" onshore electrical cable landings at Dowses Beach...this ecosystem is a fragile estuary environment, providing homes to many species needing the specific habitat	Thank you for your comment.
0040-03	Ecologically, the Dowses Beach estuarine environment is too small, fragile, and intricate to subject to any industrial entity's invasive, unproven approach.	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach.
0046-02	The environmental impact of this site is staggering to this pristine barrier beach. It is not only a peaceful haven to our residents yearlong but protects and allows for the aquatic and bird life of East Bay, the Centerville river, Scudder Bay and the Craigville marshes behind Craigsville beach.	Thank you for your comment.
0046-03	Bringing the industrial cables across the narrow isthmus connecting to the mainland will without a doubt ruin the spawning pond of the multiple fish species not only during the multiple years of construction but possibly forever.	Section 3.5 of the Draft EIS addressed the potential impacts associated with the Project's cable crossing of East Bay and Centerville River.
0047-01	it is a pristine and fragile estuary that cannot be altered	Thank you for your comment.
0047-02	2. it is a documented wildlife habitat	Thank you for your comment.
0048-07	There is eel grass at Dowses Beach, which the COP or Draft EIS does not adequately illustrate this. Once eel grass is gone, it is gone forever, and this invasive project could greatly impact its health.	While eelgrass has been identified near the landfall locations, at this time, no impacts to eelgrass are expected during the course of project development. Locations where eelgrass has been identified is provided in Section 3.4.1.1 in the Final EIS. Potential impacts to eelgrass are detailed in the Project-specific EFH Assessment, including requirements for additional surveys prior to construction and potential minimization and mitigation measures should eelgrass be identified.

Comment Number	Comment	Response
0048-08	[Dowses Beach landing site] Blue crabs, (necessary for cleaning up the sea bottom by harvesting decomposing plant and animal matter), and horseshoe crabs (used for human medical uses), also will also be at peril.	Chapter 3 of the Draft EIS presented a detailed discussion on the potential impacts associated with the Project's cable crossing of East Bay and Centerville River.
0051-01	I would like to register my opposition to the proposed onshore electrical cable landings at Dowses Beach...This area is part of a fragile estuary system and home to many varieties of wildlife on the registry of endangered species.	To avoid impact natural resources, trenchless drilling/HDD is proposed which allows the least impact to the sensitive natural resources. As described in Sections 3.3.1.8 and 4.3.1.8 of COP Volume I, horizontal directional drilling (HDD) is expected to be used at the Phase 1 and Phase 2 landfall site to avoid impacts of standard cable burial techniques in the nearshore region. HDD drilling is least invasive of all methods such as open trenching. Impact to surface ground and sediment disturbance are at the entry and exit points. See Section 3.3.1.8 for a description of HDD The engineering trajectory shows the HDD will be passing at a depth of 9m (30ft) below the surface. COP Vol III 4.3.1.8.1 Page 4-98
0054-01	THE CABLES WILL THEN TRAVEL TO THE CAUSEWAY WHICH ACCORDING TO THE TOWN OF BARNSTABLE'S ATTORNEYS REPORT TO MEPA ON NOVEMBER 28, 2022, THREATEN THE CULVERT WHERE THE 2 BAYS EXCHANGE TIDAL ACTIVITY BACK AND FORTH.	Thank you for your comment.
0055-14	We appreciate that benthic grabs and transects along the offshore export cable corridor will be done in order to update habitat maps based upon the 2020 Recommendations for Mapping Fish Habitat (Appendix H). These maps will be important to avoid and minimize the impact on eelgrass and complex habitat.	Thank you for your comment.
0055-28	We strongly support all efforts to avoid impacts to submerged aquatic vegetation (SAV) and other structured habitats along the cable route, as recommended in the Council policies. The New England Council has designated inshore areas from the coastline to 20 meters depth as HAPC for juvenile Atlantic cod...In inshore waters, young-of-the-year juveniles prefer gravel and cobble habitats and eelgrass beds after settlement, but in the absence of predators also utilize adjacent un-vegetated sandy habitats for feeding. The New England Council recently recommended an HAPC for cod spawning habitat and complex habitats. The designation overlaps the New England Wind lease area and other Southern New England lease areas and is pending approval by NOAA Fisheries. The Mid-Atlantic Council has designated all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, as HAPC for summer flounder. In defining this HAPC, the Mid-Atlantic Council also noted that if native species of SAV are eliminated, then exotic species should be protected because of functional value; however, all efforts should be made to restore native species.	Thank you for your comment.

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0057-01	Dowses Beach and the village of Osterville is not an appropriate spot. Dowses is an estuary where the Centerville River, East Bay and Phinneys Bay join. There is wild life galore in the bays and on the beach.	Thank you for your comment.
0061-02	In the last 75 years, the Town has done a solid job of turning the beach into a space where thousands of people every year find a bit of renewal. But the causeway, the jetties, and the large paved parking lot are certainly not the products of nature. They have dramatically altered the beach environment. To oppose plans to bring New England Wind cables under Dowses because that will destroy a natural habitat is clearly grossly inaccurate. The current situation is manmade.	Thank you for your comment.
0063-01	Don't destroy Dowses because it is a estuary Filled with marine life.	Thank you for your comment.
0073-03	Dowses Beach is a fragile estuarine beach. The topography alone displays its fragility as only a narrow(barely 2 car widths wide) causeway with salt bays on either side, is the sole means of connection to the mainland.	Thank you for your comment.
0074-02	Likewise, an activity that is “discontinuous” does not mean it cannot have a major adverse impact. Eelgrass is an endangered marine plant and essential to biodiversity: regular OSW anchoring activities in Nantucket Sound could affect eelgrass	While eelgrass has been identified near the landfall locations, at this time, no impacts to eelgrass are expected during the course of project development. Locations where eelgrass has been identified is provided in Section 3.4.1.1 in the Final EIS. Potential impacts to eelgrass are detailed in the Project-specific EFH Assessment, including requirements for additional surveys prior to construction and potential minimization and mitigation measures should eelgrass be identified.
0086-04	Estuarine Dowses Beach is a Cape Cod natural treasure, home to the endangered piping plover, spawning habitat for fin fishes, a wildlife and sea bird refuge, environmental home of horseshoe crabs, oysters and other shellfish...	Thank you for your comment.
0095-5-04	I'm concerned about the aquatic pressure waves. The impact that it will have on the natural environment. And we know that these waves cause all kinds of problems as far as humans onshore. I have to believe that it's going to also cause an aquatic impact. I don't know that's discussed elsewhere. I'm concerned about the relationship to that. I'm also concerned about the breaks in -- breaks and weakening in the wind and its impact especially on our salt marshes that protect us from ocean storms and northeasters and hurricanes. The wind change or the weakening of wind could indeed have a significant impact on the rooting system on our salt marshes, making the plants, the root system, not go as deep because of the change in wind pressure and direction that results when a storm comes through, that it -- it devastates those -- those marsh areas in causing potentially more damaging floods in our areas that currently are in danger.	The wake affect is described in Project Appendix B of the EIS.

O.5.5 Finfish, Invertebrates, and Essential Fish Habitat

Table O.5-5: Responses to Comments on Finfish, Invertebrates and Essential Fish Habitat

Comment Number	Comment	Response
0023-05	Because of the estuarine character of greater Dowses, nearly countless species of taxa make their home, either permanently or on a migratory basis, in and around the beach, the bays, and the estuary. We believe the HDD operation on and under the seabed will divert the natural movement patterns of local fish stock, greatly decimate shellfish numbers, and negatively impact the considerable local horseshoe crab population...The ditching of the causeway, if that is the option used, will inhibit cross-bay spawning for species of fish that use the calm waters of Phinney's Bay to reproduce each spring.	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach. More information on potential impacts to finfish and coastal habitats were addressed in Sections 3.6.2.3 and 3.5.2.3 of the Draft EIS, respectively.
0055-15	We recommend the Final EIS evaluate impacts relative to the new NEFMC HAPC designation, currently under review by NMFS. Per the Southern New England HAPC Framework document, the HAPC is defined as the presence of cod spawning and complex habitat within areas where offshore wind development is being planned and/or constructed. The spatial extent of this habitat area is limited to offshore wind lease areas, given that impacts associated with offshore wind development are of significant concern to the New England Council.	Section 3.6.1.3 of the Final EIS has been updated and now includes a discussion on the new Atlantic cod HAPC.
0055-17	Beneficial reef effect impacts are merged with minor/moderate adverse impacts of habitat conversion. Different species are likely to be affected negatively or positively by the addition of artificial substrates and structures to their environment and by the removal or alteration of existing benthic habitats. The potential for interactions between species attracted to the artificial substrates and structures and other species in the ecosystem should also be considered, for example in terms of predation rates. Whether these structures will increase fish production, or simply cause spatial aggregation, is unclear.	The conclusion of both adverse and potential beneficial impacts is based on the understanding that habitat conversion effects resulting from project construction and the presence of structures will benefit some finfish and EFH species at the expense of others depending on their habitat preferences. The best available science indicates that reef effects resulting from the presence of structures clearly benefits some fish and invertebrate species that associate with hard substrates and/or vertical structures in the water column. Related reef effects on food web productivity and changes in predator prey relationships are also likely to benefit some species at the expense of others, but the specific nature of these effects is difficult to predict with certainty. These complex effects will interact with changes in

Comment Number	Comment	Response
		commercial and recreational fishing and other activities, also likely resulting in additional effects that are difficult to predict.
0055-23	The Councils support time of year restrictions to reduce potential impacts to sensitive life stages of fishery species, to reduce impacts to fisheries, and to minimize impacts to important habitat throughout the project area, including the offshore cable route...Appendix H states that pile driving activities will not occur from January 1 to April 30 and that non-horizontal directional drilling cable laying activity within Nantucket Sound waters will not occur from April to June (Table H-1). The Draft EIS states that the pile driving restrictions are meant to protect the North Atlantic Right Whale, which would confer benefits to any cod spawning activity in the area (page 2-37). The purpose of the cable laying activity time-of-year-restriction is a request from Massachusetts Department of Marine Fisheries to avoid high concentration of fishing activities (squid, whelk, flounder) and spawning and egg laying activities (page 3.9-24). The Draft EIS should clarify which species are spawning and egg laying during this time period in this area and whether this includes cod spawning. There is also the assumption that species would return to the area and normal fish behavior would resume once the pile driving stops (page 3.6- 27 and 3.9-10). Additional rationale should be provided on this as it is possible the impacts could be longer-term or even permanent, depending on the species. For example, research by the Massachusetts Department of Marine Fisheries found that relatively minor disturbances from gillnet fishing interrupted the development of cod spawning aggregations (Dean et al. 2012); it is reasonable to expect construction activities may do so as well. Also, given time-of-year restrictions are mitigation measures, the rationale for why this restriction is proposed should be included in Appendix H and cross-referenced in the Draft EIS.	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).
0055-31	The potential impacts of detonating unexploded ordnance (UXO) are evaluated for mammals but not for fisheries, and should be evaluated for both resources, as well as in terms of possible impacts to navigation. If noise above different thresholds impact mammals and not fish, and such thresholds are exceeded by specific impact producing factors, these details should be specified.	Section 3.7 of the Final EIS discusses UXO impacts in detail. Specific noise and acoustic impacts to finfish and invertebrates are discussed in Section 3.6.2.3 of the Final EIS.
0055-38	Entrainment of water during some types of cable installation equipment is briefly mentioned as an adverse impact on pelagic eggs and larvae of some species on pages 3.4-8, 3.4-21, 3.6-20, and 3.6-22. The Final EIS should estimate the numbers of eggs, larvae, and zooplankton that may be entrained due to this type of cable installation technique to provide justification for the rationale behind the resulting impacts determination.	"Section 3.6.2.3 of the Final EIS discusses entrainment. Additional information on entrainment impacts on finfish, pelagic eggs, and larvae is also provided in Section 5.1.2.1 of the Project's Essential Fish Habitat (EFH) Assessment.

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0083-07	We recommend that BOEM... Select Alternative C-1, to avoid offshore export cable corridor siting in the western portion of the Muskeget Channel, an area of ecologically important hard bottom, complex habitat.	Thank you for your comment.
0083-34	We note that the Magnuson Stevens Fishery Conservation and Management Act 306 requires federal agencies, such as BOEM, to consult with NMFS on activities that could adversely affect EFH... The area of New England Wind and the associated OECC will take place in EFH designated for many species, including several overfished fish populations such as Atlantic cod, Atlantic wolffish, winter flounder, witch flounder, yellowtail flounder, and ocean pout. Atlantic cod is a fish species of particular concern in the waters off southern New England as their once legendary populations are now severely depleted. Rebuilding overfished cod populations hinges on access to healthy spawning, nursery and juvenile habitats. There are also several fish species listed under the ESA that are present in the Project Area, including giant manta ray, Atlantic sturgeon, Atlantic salmon, and shortnose sturgeon. NOAA also identifies habitat areas of particular concern (HAPCs), which are high-priority areas for conservation, management, or research because the areas are rare, sensitive, stressed by development, or important to ecosystem function. HAPCs are discrete subsets of EFH that provide important ecological functions or are especially vulnerable to degradation. While HAPCs are recognized due to their importance for conservation, management, and research, designation as an HAPC does not confer any specific habitat protection; however, regional management councils may take HAPCs into consideration when minimizing adverse impacts from fishing.	Appendix A of the EIS presents the consultations that have occurred for this Project.
0083-36	The Draft EIS also finds that changes in fluid flow caused by the presence of many structures on the OCS could potentially influence finfish, invertebrates, and EFH on a broader spatial scale. It notes that an important seasonal feature influencing finfish and invertebrates is the cold pool, a mass of cold bottom water in the Mid-Atlantic Bight overlain and surrounded by warmer water. The Draft EIS explains that the "cold pool forms in late spring and persists through summer" and that "[d]uring summer, local upwelling and mixing of the cold pool with surface waters provides a source of nutrients, influencing the ecosystem's primary productivity, which in turn influences finfish and invertebrates." According to the Draft EIS, offshore wind foundation structures could affect local mixing of cool bottom waters with warm surface waters. Moreover, the "presence of many offshore wind structures could affect local oceanographic and atmospheric conditions by reducing wind-forced mixing of surface waters and increasing vertical mixing of water forced by currents flowing around foundations." Although BOEM does not anticipate that these local impacts will cumulatively impact the	Section 3.6.2.1 of the Draft EIS presented a discussion on the presence of Project structures and the associated impact analysis, particularly their potential impact on the existing cold pool feature in the lease area.

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	approximately 11,580 square mile cold pool, it acknowledges that the impacts on the cold pool are not fully understood. In the Final EIS, BOEM should attempt to better quantify the general hydrodynamic impacts, including impacts to the cold pool, from WTG structures and include such revised impacts in its impact level ratings.	
0083-37	Unlike the Draft EIS for the Revolution Wind Draft EIS, the New England Wind Draft EIS provides only cursory analysis of the potential effects of hydrodynamic impacts on spawning fish populations in the vicinity of the proposed project's infrastructure. For example, the Revolution Wind Draft EIS notes that hydrodynamic effects caused by the presence of WTG structures could alter dispersal patterns for pelagic and demersal eggs and larvae, which could influence the productivity of some spawning fish populations. The Revolution Wind Draft EIS also observes that WTG structures have the potential to alter stratification patterns that support the base of the marine food web and that these changes in circulation patterns have the potential to negatively affect the reproductive success of numerous fish and invertebrate species. The Final EIS for New England Wind should provide similar analysis on the impacts to spawning fish populations from hydrodynamic turbulence, including any particular fish stocks that are known to spawn in areas of the New England Wind area.	Section 3.6.2.3 of the Final EIS has been updated to include additional text relating to the potential impacts on larval dispersal and settlement patterns as a result of hydrodynamic impacts arising from the presence of structures.
0083-38	Noise could lead to interference of cod acoustic communication. Cod produce vocalizations (“grunts”) during spawning that overlap in frequency with anthropogenic noise. Measurements of cod grunts along with shipping and ambient sound levels made during spawning periods in the vicinity of Stellwagen Bank suggest that the distances over which cod can detect grunts might be reduced due to masking by vessel noise. Cod grunts are thought to serve a role in courtship and attracting mates, and interference of this communication by wind farm-related noise could potentially compromise spawning success and hence population health. Studies relating to European wind farms have suggested that operational noise from wind turbines might be detectable by cod to distances of 4-13 km. In one study, tracking of small numbers of tagged cod at a Belgian wind farm during periods when individual wind turbines were out of operation relative to periods before and after suggested no evidence of behavioral avoidance. In contrast, another study observed an increase in catchability of cod within 100 m of a wind turbine when it was not operating. Overall, impacts within the range of noise detectability might more likely relate to masking of cod calls and reduction of communication ranges than to avoidance or similar behavior. The Draft EIS’s conclusions on the likely noise impacts on Atlantic cod and other species from the New England Wind project are largely consistent with these studies... The Draft EIS recognizes that noise associated with operational WTGs may be	Thank you for your comment.

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	audible to some finfish and invertebrates. It notes that when operational, "WTGs would produce noise that can cause masking impacts, but thus far, noise related to operational WTGs have not been found to have an impact on finfish." It similarly observes that there is no information suggesting behavioral impacts on finfish from noise generated by WTGs.	
0083-39	BOEM has not conducted a separate analysis on the extent to which either Habitat Alternative would reduce noise impacts to EFH and finfish that inhabit the cable route areas under consideration. While Alternatives C-1 and C-2 both involve separate cable route options and would not result in changes to the WTG layout, in the Final EIS, BOEM should improve its analysis of whether the two Habitat Alternatives would reduce noise impacts from cable emplacement activities in the areas in which OECC siting is avoided under the different cable route alternatives.	Section 3.6.2.3 of the Draft EIS noted the overall noise impacts arising from cable emplacement activities are expected to be localized, short-term, and negligible, i.e. too small to be measurable. As such any differences that may exist between the two proposed alternatives would also be too small to be measurable.
0083-42	The Draft EIS finds that either Habitat Management Alternative would avoid some impacts on finfish, invertebrates, and EFH due to a decrease in the extent of cable installation in complex habitats, including the avoidance of cod habitat in the areas avoided. It notes that "because of the rare habitats provided by complex and hard coarse deposit seafloor types, avoidance of disturbance to these habitats would also result in lower impacts." The Draft EIS concludes that "overall, Alternative C-2 would have greater impacts than Alternative C-1 on finfish and invertebrates that use complex seafloor habitats and on EFH in those habitats." Although BOEM still assigns the same impact rating for benthic resources, invertebrates, finfish and EFH for Alternative C-1–negligible to moderate–as for the Proposed Action, the reduced impacts to complex habitats, and the finfish and invertebrates that rely on them, when compared to the other alternatives, provides justification for selection of this option. The Muskeget Channel is part of the HAPC for inshore juvenile Atlantic cod. Further, the western Muskeget Channel consists mainly of complex habitats, and areas of complex habitat like Muskeget Channel are important for Atlantic cod spawning. Selecting Alternative C-1 and avoiding siting the OECC in the western Muskeget Channel will, therefore, reduce impacts to the juvenile cod HAPC and has the potential to reduce impacts to spawning cod as well. In the Final EIS, BOEM should expand on its analysis of the impacts resulting from Alternative C-1 and, specifically, include more detailed analysis on any reduced impacts to juvenile cod HAPC and spawning cod habitat under this alternative.	Section 3.6.2.4 of the Draft EIS included a discussion of the potential impacts of Alternative C.
0083-110	The proposed OECC corridors will cross areas that have been designated HAPC for juvenile Atlantic cod in Massachusetts state waters. The juvenile cod HAPC is a subset of the area designated as juvenile cod EFH, and is defined as the inshore areas of Southern New England between 0 to 66 feet deep relative to mean high water. This HAPC contains structurally	Potential Project impacts to juvenile and adult summer flounder HAPC and juvenile Atlantic cod HAPC are addressed in Final EIS Section 3.6.2.3. Further discussion of impacts to HAPC as a result of the proposed Project are provided in the Project EFH Assessment.

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	complex hard bottom habitats that provide juvenile cod with protection from predators and supports juvenile cod prey. The proposed OECC will also cross areas that have been designated HAPC for adult and juvenile summer flounder in state waters. The Mid-Atlantic Fishery Management Council has identified HAPC for summer flounder as "all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH." Additionally, in July 2022, the New England Fishery Management Council (NEFMC) approved a proposed HAPC that overlaps offshore wind energy lease areas in southern New England, including that of New England Wind. NEFMC selected this area "to highlight its concerns over potential adverse impacts from offshore wind development on: (1) sensitive hard-bottom habitats; and (2) cod spawning activity." In addition to Atlantic cod, this proposed HAPC emphasizes the importance of complex habitat on the egg, juvenile, and adult life stages of species ranging from herring and scallops to monkfish, skates, winter flounder, and red hake.	
0083-113	The presence of WTG structures could also cause hydrodynamic effects... The Draft EIS observes that human-made structures, especially tall vertical structures such as foundations, alter local water flow at a fine scale. While the Draft EIS notes that a study found that WTG foundations in southern New England would not have a significant influence on southward larval transport during storm events, foundation placement could either increase or decrease larval dispersion and speed, depending on initial location. It finds that disruption of mean water flows could occur within 230 feet and downstream of each WTG foundation, but that the disruption of water flows is unlikely to reach from one WTG foundation to an adjacent foundation. The Draft EIS notes that a study of the hydrodynamic impacts of offshore wind in the North Sea "indicated a reduction in sea surface currents and potentially a reduction in the temperature and salinity distribution and stratification within areas of wind farm operations." Although the study did not identify an overwhelming impact on biological productivity, the Draft EIS recognizes that the potential change in surface water mixing could result in changes to biological productivity of the southern New England Wind.	Section 3.6.2.1 of the Draft EIS presented a discussion on the presence of Project structures and the associated impact analysis, particularly their potential impact on the existing cold pool feature in the lease area.
0083-114	Underwater noise from anthropogenic sources, including from offshore wind development, can have a variety of effects on marine fishes, including behavioral impacts, masking of communication or other biologically-important sounds, physiological changes, hearing loss, and physical injuries. Noise impacts to fish vary depending on the type of fish species. The hearing specialist group of fish, which includes Atlantic cod, hake, and black sea bass, rely on sound for communication and other	Noise impacts associated with the Project's WTG operation and vessel noise was found to be minor. Noise associated with the Project and its potential impact on fish, invertebrates, and EFH were addressed in Section 3.6.2.3 of the Draft EIS.

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	behaviors and, thus, are more susceptible to noise impacts. Atlantic cod, in particular, have relatively strong hearing abilities, over a frequency range that overlaps with many forms of anthropogenic noise, including pile-driving, vessels, and wind turbine operation. Moreover, as recognized by BOEM, "noise impacts could be greater if they occur in important spawning habitat, occur during peak spawning periods, and/or result in reduced reproductive success in one or more spawning seasons, which could result in long-term effects to populations if one or more year classes suffer suppressed recruitment." There are multiple studies pointing to reasons for concern over possible impacts of wind farm-related noise on cod spawning. Experimental work exposing captive adult cod during the spawning period to playback of noise over frequencies typical of shipping and wind turbine operation has shown negative impacts on egg production and fertilization rates in adult cod, reducing viable embryos by 50 percent. Playback of recordings of ship noise has shown impacts on growth and body shape in larval cod as well as increased susceptibility to predators and hence implications for compromised survival. Spawning behavior in the wild is known to be generally sensitive to disruption: fishing activity on spawning grounds, for instance, has been shown to disrupt spawning even for those fish not captured.	
0083-126	We recommend that BOEM... Conduct Atlantic cod spawning surveys in the area of Muskeget Channel to better understand impacts from offshore wind development and cable laying on spawning cod.	New England Wind has collected 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 that includes a neuston net survey during May through December, a demersal otter trawl survey, and a drop camera survey. The fisheries monitoring framework will be further developed for construction and post-construction monitoring. More information fisheries surveys can be found in Appendix H of the Final EIS.
0086-16	Prominent marine scientist Arthur Popper has studied the effects of anthropogenic (human made) noise on fishes and found - along with his fellow marine scientists from Germany, the Netherlands and Belgium - that noises from "ships, construction, and sonar." etc. have the potential to affect the distribution of fish and their ability to communicate, reproduce, and avoid predators." Importantly, noises could also lead fishes to avoid their "preferred spawning sites." Noises also "mask natural sounds" that are necessary for fish to thrive including •communication sounds from other fish, and sounds produced by prey and approaching predators." British marine scientists found that fishes exposed to noise pollution suffer from "stress, hearing loss, behavioral changes." The importance of hearing (whether temporary or permanent) cannot be underestimated and the behavioral disorientation or the inability to hear a nearby predator can be a matter of life and death. Stressed marine animals are more susceptible to	Project noise impacts to fish and invertebrates are addressed in Final EIS Section 3.6.2.1 (Noise impacts associated with Alt A), Section 3.6.2.3 (Noise impacts associated with Alt B), and Section 3.6.2.4 (Alt C-1 and C-2).

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	disease, early death and to predators. Plastic pollution is visible but noise pollution suffered by marine animals is "silent" to humans because "few citizens stick their head in the water" long enough and "our heads are not designed to hear in the water,"· according to marine scientist Carlos Duarte.	
0095-5-03	I'm concerned about the possibility of no aquatic swim zones that would be caused by a combination of factors. The low frequency noise of the windmills working themselves, the windmill motors themselves, and the generation of electricity. These buffer or no swim zones, that I'm fearing, would indeed cut off the flow of aquatic activity from ocean -- from the open ocean into our rivers, bays and salt marshes.	The noise generated from the Project would have negligible to minor impacts on finfish and invertebrates and their distribution around the Project's structures. Additional information on noise generated from the Project and potential impacts on fish and invertebrates are addressed in Final EIS Section 3.6.2.3.
0095-6-02	what is your definition of cumulative impacts? Does it take into account the hydrological and ecological function like wind wakes, changes in upwelling, temperature, or other ecological functions or hydrological functions that, say, might affect something like phytoplankton, which, as I understand, absorbs a lot of carbon. And necessary for fish to feed on, on food whale.	Appendix E of the Draft EIS stated that 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]). This appendix discussed 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).
0097-1-02	I've read different articles that would suggest that some scientists are pretty concerned about what may happen to phytoplankton blooming and whatnot with the changes in wind forces that will be imparted by the wind turbines themselves, and the wind farms. And as more farms come online, it would seem that the cumulative effects would expand also with that. There's wind wakes... I just would like to know what plans there are to include that in the ecosystem, slash, environmental study.	Potential impacts associated with wake -related wind speed deficits are addressed in Final EIS Section 3.6.2.3. Based on the best available science and data, Project impacts to wake-related wind speed deficits in lee of wind turbine structures and associated biological productivity would be negligible.

O.5.6 Marine Mammals

Table O.5-6: Responses to Comments on Marine Mammals

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0015-01	I strongly disagree with offshore wind farms.https://dgrnewsservice.org/civilization/ecocide/climate-change/how-many-more-dead-whales/?utm_source=DGR+News+Service&utm_campaign=19bd79de17-RSS_EMAIL_CAMPAIGN&utm_medium=email&utm_term=0_51489b99cd-19bd79de17-481430028	Thank you for your comment.
0019-03	I do find the noise caused by pile driving in construction of the turbines to be concerning in terms of possible effects on whales, dolphins, and possibly other marine life (still, the overall benefits to marine life of offshore wind projects far outweigh the downsides I believe).	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)."
0029-14	Extreme noise pollution would ensue from the heavy machinery drillings, tunneling, digging, pile driving, helicopters, land vehicles, boats, service vehicles, drones, etc. There are studies by marine scientists that fishes and marine mammals such as whales became deaf, disoriented, even die because of anthropogenic noise pollution. Unable to hear an approaching predator, the prey is caught.	Section 3.7.2.3 of the Final EIS addressed the potential impacts of underwater noise within the Noise IPF subsections.
0029-15	Are the whales washing up on the beaches of New Jersey victims of disorientation caused by anthropogenic noises?	Based on necropsy current reports, the recent whale stranding on NY and NJ beaches are predominately the result of vessel strikes; and many are

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		from unknown causes. Noise sources resulting from offshore wind development is from high resolution geophysical surveys and geotechnical surveys. These noise sources do not produce enough acoustic energy within the frequency of marine mammal (particularly large whale) hearing to result in auditory injury or non-auditory injury. Additionally, all wind-based activities are required to have trained lookouts who must report all whale, dolphin, and sea turtle detections to NMFS, and to date there have been no vessel strikes of marine protected species resulting from any wind survey activities. The vessel strikes are not known to be correlated with any anthropogenic noise; but rather are attributed to large numbers of vessels in areas that overlap with foraging and migrating whales.
0046-05	The impact of the wind turbines vibration themselves in the migration of fish and especially whales goes without question	Thank you for your comment.
0049-03	They emit constant noise n vibration below n above sea level messing with our sea life that uses echolocation —sharks, whales, seals dolphins n even bats—all critical to a healthy ecosystem n causing their deaths.	Thank you for your comment.
0068-02	What about the whale population to be affected and endangered with a severely detrimental impact on their use of echolocation and ability to navigate safely through Nantucket Sound?	Section 3.7 of the Draft EIS presented a detailed discussion of potential impacts on marine mammals from the proposed Project. In addition, Appendix H includes the proposed mitigation and monitoring measures.
0070-04	The North Atlantic right whale is entering its seventh year of an Unusual Mortality Event due to vessel strikes and entanglement with fishing gear, and the population cannot withstand additional mortality. It is therefore critical that BOEM accurately assess risks to the species by using the most up-to-date population estimate of 340 individuals, rather than the out-of-date abundance estimate used in the Draft EIS of 368 individuals. Given the right whale habitat use of the area as well as the importance of the area for multiple age classes of right whales, socializing animals, and as core foraging habitat, we recommend BOEM extend the time period of its proposed seasonal restriction for pile driving from January1-April 1 to December 1-April 30.	Section 3.7.1.2 of the Final EIS has been updated to include the most current population estimate for the NARW and is provided in Table 3.7-1 and all other occurrences. As discussed in Section 3.7.2.3 of the Final EIS, the seasonal restriction for pile driving for this Project is January 1 through April 30 which coincides with the months of greatest predicted NARW abundance within and in the vicinity of the Project area.
0083-02	We recommend that BOEM... Use the best available science and primary sources when determining which [marine mammal] species occur in the Project Area and with what frequency. Use the more accurate population estimate of 340 individuals for the critically endangered North Atlantic right whale.	Section 3.7.1.2 of the Final EIS has been updated to include the most current population estimate for the NARW and is provided in Table 3.7-1 and all other occurrences.
0083-11	BOEM misrepresents several estimates of seasonality and occurrence of marine mammals... in the Project Area, and these inaccuracies should be corrected in the Final EIS... The Draft EIS should include information on the feeding biologically important area (BIA) for fin whales designated by NMFS east of Montauk Point from March to October. Feeding behavior	Section 3.7.1.2 of the Final EIS has been updated to include the most current population estimate for the marine mammals and are provided in Table 3.7-1. These estimates are based on the best available data from the most recent NMFS stock assessment reports (SARs) and published

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	for this species has also been observed in and near the proposed Project Area.	literature. Information on the fin whale BIA has been added to the text in Section 3.7.1.3 in the Final EIS.
0083-12	[In the Draft EIS] The overall impact for marine mammals and increased noise and vessel traffic is lowered based on timing restrictions and other mitigation measures specifically intended to avoid adverse effects on right whales. However, as discussed in Section II.C, our groups find the proposed mitigation measures inadequate. For those reasons and the reasons detailed below, the impact analysis for marine mammals... requires revision.	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).
0083-13	There are critical omissions from BOEM's sound exposure analysis presented in the Draft EIS that must be addressed in the Final EIS... it is unclear from the impacts analysis if noise attenuation technology will be required during impact pile driving and other activities. Three levels of noise attenuation (0 dB, 10 dB and 12 dB) are modeled in the marine mammal section but it is not stated in the Draft EIS which level must be attained, if any. The acoustic impact analysis presented in Appendix III-M of the New England Wind COP states that a noise abatement system (NAS) performance of 10 dB broadband attenuation was chosen for the study of acoustic impacts, but also notes that New England Wind expects to implement noise attenuation mitigation technology to reduce sound levels by approximately 12 dB or greater. A 12 dB target reduction is echoed in the mitigation and monitoring measures listed in Appendix H of the Draft EIS, which states that the applicant will implement noise attenuation mitigation to reduce sound levels by a target of approximately 12 dB or greater. However, in the sea turtle section, the Draft EIS states that the applicant has committed to a minimum of 6 dB of noise reduction	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

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	from abatement. BOEM's analysis of noise impacts in the Draft EIS should clearly state what level of noise attenuation will be required so potential impacts to marine mammals can be accurately evaluated.	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).
0083-14	There are critical omissions from BOEM's sound exposure analysis presented in the Draft EIS that must be addressed in the Final EIS... the Draft EIS's description of potential noise effects from operational WTGs is also cursory and does not provide any analysis of sound source levels compared to thresholds or ambient noise. Instead, it is merely compared to vessel noise, which is not an appropriate comparison because vessel noise consists of moving, ephemeral noise sources not laid out in a permanent grid like what is proposed for New England Wind. A wealth of research exists on the impacts of operational noise from offshore wind turbines on marine life and the importance of reducing this impact. Best available scientific information indicates that, during the operation phase, offshore wind turbines may generate noise audible and potentially impactful to large whales and other marine species over significant distances. Understanding levels and impacts of operational noise should be an immediate research and monitoring priority for BOEM as the first offshore wind projects are constructed in the United States. The Final EIS should include a proper, quantitative analysis that considers the operational noise generated by turbines.	Section 3.7.2.1 and 3.7.2.3 of the Final EIS includes a discussion on WTG operational noise. While BOEM acknowledges that offshore wind operational noise monitoring is a key data collection goal, there is not a wealth of research and empirical data regarding the sound field produced by WTGs or its perception by and potential impacts to marine species. Data that have been published can lend some information but are not fully comparable to the operations, or species, that will be conducted in the US. Data are also often conflicting in the published science owing that site conditions and local acoustic environment likely have a significant role in understanding potential WTG noise impacts.
0083-18	The waters off southern New England are a critically important foraging area for North Atlantic right whales; for this Final EIS, and other Draft EISs that are forthcoming, BOEM must fully assess the impacts associated with disturbance of North Atlantic right whales and other marine mammal species during foraging, at the spatial and temporal scale those impacts are expected to occur, for individual projects and cumulatively across projects. As the energetic requirements of many marine mammal species are not yet known, we recommend BOEM proceed with this analysis in a precautionary manner, and support research aimed at addressing these knowledge gaps.	"The best available data and information has been used to evaluate NARW and other marine mammal distributions, foraging behaviors and the potential impacts the Proposed Project may have on these animals in Sections 3.7.2.3 of the Final EIS. BOEM will continue to evaluate these animals and potential interactions they may have with future offshore wind developments as more research and data become available.
0083-48	According to the Draft EIS, 38 marine mammal species, which comprise 39 management stocks, are known to occur year-round, seasonally, and/or incidentally in the geographic analysis area, which covers the Northwest Atlantic OCS. Sixteen of these species and stocks are identified as being potentially present in the proposed offshore export cable corridors (OECC) and Southern Wind Development Area (SWDA), including species and stocks with regular, common, and uncommon occurrence... Our groups have several general and specific concerns with BOEM's	Sources used for determining species occurrences and seasonality have been reviewed and are provided in Section 3.7.1.2 of the Final EIS, Table 3.7-1 (footnote 'c'), as well as in text as appropriate. These sources cover the best available data for the Project area, and include data collected for surveys that overlap with the Project area. Appendix B has species information and Draft EIS Section 3.7.1.2 provides an overview of occurrences, including seasonality. Given the

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	analysis of marine mammal... occurrence, abundance, and seasonality in the Project Area... the Draft EIS does not provide a comprehensive assessment of all marine mammal... species with common occurrence in the Project Area. BOEM provides minimal descriptions of general and Project Area-specific occurrence of individual species expected to occur in the Project Area. The most detailed description is provided for the North Atlantic right whale, but thorough descriptions are missing for the other species. Information on species is scattered across pages and therefore difficult to find and assess. Descriptions of species-specific occurrence in the Project Area should be provided by BOEM as the agency responsible for assessing environmental impacts of the proposed activity, not by the developer or another agency. BOEM can certainly refer readers to these documents for more information, but still should provide a summary of such information to inform the public and its own analysis.	page limit requirements for this EIS, only a brief overview of species can be provided in the Affected Environment section; additional information is included in appendices and the reader is referenced to other documents where more detailed descriptions can be provided.
0083-49	BOEM says "Additional information regarding life history characteristics and population status of additional marine mammal species is provided in Appendix B, Supplemental Information and Additional Figures and Tables." This appendix includes general information but does not include specific occurrence information for the Project Area. BOEM needs to summarize the data and information that has been collected during studies that overlapped with the Project Area (e.g., sightings data from the Atlantic Marine Assessment Program for Protected Species (AMAPPS), sightings and acoustic data from the Northeast Large Pelagic Survey Collaborative studies, Protected Species Observer (PSO) data, etc.). We recommend that BOEM revise the description of the affected environment section to incorporate an independent analysis of all species likely to occur in the Project Area, using relevant and up-to-date primary sources to support its analysis.	Sources used for determining species occurrences and seasonality have been reviewed and are provided in Section 3.7.1.2, Table 3.7-1 of the Final EIS. These sources cover the best available data for the Project area, and include data collected for surveys that overlap with the Project area as indicated in your comment. More information can also be found in Final EIS Appendix B.
0083-51	Fewer than 340 individuals [of the North Atlantic right whale] now remain in the population, including fewer than 70 reproductive females. The species is entering its seventh year of a UME–designated by NMFS due to unsustainable levels of mortality and serious injury from vessel strikes and entanglement in fishing gear–and its recovery is further hindered by underwater noise pollution and climate change driven habitat shifts. The Draft EIS correctly states that the right whale is in dramatic decline and is experiencing high mortality combined with low calving rates, implying a population that cannot withstand further losses or additional stress if the species is to reverse its decline and eventually recover. However, BOEM uses the latest stock assessment report's estimate of abundance of 368 individuals, a number that is now at least three years out of date. We encourage the use of the 340 population	The most current population estimate has been updated for the NARW (Section 3.7.1.2, Table 3.7-1 of the Final EIS and all in-text occurrences). Further, the seasonal restriction for pile driving for this Project is January 1 through April 30, which coincides with the months of greatest predicted NARW abundance within and in the vicinity of the Project area. This comment is addressed in Section 3.7.2.3 of the Final EIS.

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	estimate to reflect the species' true status and subsequent risk assessment more accurately. NMFS also recently included whales experiencing sublethal injury and illness as part of the UME, which the agency refers to as "morbidity." BOEM must incorporate into consideration that, to date, 97 right whales have been impacted by the UME (i.e., from mortality, serious injury, and morbidity).	
0083-52	BOEM misrepresents several estimates of seasonality and occurrence of marine mammals... in the Project Area, and these inaccuracies should be corrected in the Final EIS. It is unclear what the seasonal occurrence designations are based on. For example, blue whales are expected to occur in the Project Area only rarely, but seasonal occurrence in the SWDA is listed as winter. BOEM should provide more detail on the sources of data for information on seasonality, and, as a general matter, define the seasons referred to throughout the Draft EIS by month or date.	BOEM acknowledges the comment and will provide months for the seasonality; however, as stated in an earlier comment, these months may shift as climate shifts. This comment is addressed in Section 3.7.1.2, Table 3.7-1 of the Final EIS footnote 'd'. Additionally, seasonal occurrences in this table have been reviewed, and are now only provided for species with common, regular, or uncommon occurrences (i.e., not for the rare blue whale).
0083-55	The Draft EIS does not include the original data source(s) for the average monthly and annual average marine mammal densities, instead referencing Park City Wind (2022) and the project proponent's incidental harassment authorization (IHA) application. However, the acoustic impacts analysis presented in Appendix III-M of the New England Wind COP states that density estimates for marine mammals were obtained from the Roberts et al. models, including the 2021 updated model for North Atlantic right whales. BOEM should clarify the source of the marine mammal density estimate in the Draft EIS, including whether or not they reflect the best available scientific information (i.e., the 2022 ver. 12 update to the Roberts et al. models).	The density estimates provided in the EIS are from the Applicant's modeling report which was updated in January 2023 to include the most up to date density data from Roberts et al. (2022) for all species, which reflects the best available information for these species at the time of publishing the Final EIS. This has been updated in Section 3.7.1.2 the EIS.
0083-56	BOEM anticipates that the Proposed Action (encompassing construction, operations, and decommissioning of Phase 1 and Phase 2, including Phase 2 South Coast Variant) would have negligible to moderate adverse impacts and could potentially include minor beneficial impacts on marine mammals."... The overall impact for marine mammals and increased noise and vessel traffic is lowered based on timing restrictions and other mitigation measures specifically intended to avoid adverse effects on right whales. However... our groups find the proposed mitigation measures inadequate. For those reasons... the impact analysis for marine mammals..... requires revision.	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

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		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).
0083-58	BOEM's conclusion that marine mammal species would experience no more than moderate adverse impacts from the Proposed Action, and that the impacts posed by vessel traffic would be minor with no population-level impacts expected, significantly underestimates the risk of vessel strike on marine mammals, and particularly the North Atlantic right whale... Even a single lethal vessel strike could jeopardize the species' survival. BOEM defines major impacts as "detectable and measurable," "of severe intensity," and "can be long lasting or permanent." Further, major impacts "to individuals and/or their habitat would have severe population-level effects and compromise the viability of the species." Based on this definition, vessel strike clearly represents a major impact for North Atlantic right whales. BOEM should capture this distinction for this critically endangered species in its impact analysis, as it has done so previously; this will help ensure that appropriate avoidance, minimization, and mitigation measures are developed and required to address the outsized risk posed to North Atlantic right whales.	BOEM agrees that vessel strikes on NARWs could have population-level effects. The vessel traffic IPF section has been reviewed and the impact determinations were reevaluated, resulting in a change in determinations. This is presented in Section 3.7.2.3 of the Final EIS within the Traffic IPF subsection.
0083-59	BOEM provides support for its "moderate" adverse impacts conclusion by stating that "the resource would likely recover completely when IPF stressors are removed and/or remedial or mitigating actions are taken." Vessel strike risk for right whales, and large whales generally, will never be simply "removed," either under the No Action Alternative or Proposed Action. BOEM is thus reliant on remedial or mitigating actions to support a minor or moderate impact determination. Indeed, BOEM discounts the possibility of vessel strike based upon adherence to voluntary implementation of measures by the developer to reduce vessel strike risk. Non-mandatory and non-enforceable measures should not be considered effective mitigation strategies. Moreover, to justify a minor determination for a major source of mortality, some discussion and/or quantitative analysis should be conducted regarding the base likelihood for vessel strikes and the effectiveness of required mitigation strategies.	BOEM agrees that vessel strikes on NARWs could have population-level effects. The vessel traffic IPF section has been reviewed and the impact determinations were reevaluated, resulting in a change in determinations. This is presented in Section 3.7.2.3 of the Final EIS within the Traffic IPF subsection.
0083-60	We also remind BOEM that there is little to no literature currently available to support the assumption that offshore wind development will provide tangible benefit to marine mammals. In fact, recent scientific information suggests that hydrographic changes induced by the turbines may affect marine mammal prey in a variety of ways, many of which are still to be determined. Due to a lack of evidence and significant	BOEM agrees that there is limited information; and the beneficial component, if any, is not considered in "balancing" negative and positive impacts. The impacts for potential increase in prey is evaluated on its own merit and for its own assessment. i.e., minor beneficial impacts are only applicable to seals and small odontocetes as a result of increased foraging and sheltering opportunities due to the presence of structures IPF; this

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	uncertainties, BOEM should not include an assumption of increased prey availability as a benefit as part of its overall conclusion on the impacts of the Proposed Action.	benefit does not have any effect on the overall assessment of impacts resulting from the presence of structures. Additionally, a statement regarding a caveat to beneficial effects is included in the Draft EIS ("Beneficial effects, however, may be offset given the increased risk of entanglement due to derelict fishing gear on the structures."). This comment is addressed in Section 3.7.2.1 of the Final EIS within the Presence of structures IPF sub header.
0083-61	There are critical omissions from BOEM's sound exposure analysis presented in the Draft EIS that must be addressed in the Final EIS. While this information is included in the appendices to the New England Wind COP, BOEM should transpose all information critical to supporting its impact analysis into the Final EIS. First, in the model predicted exposure ranges for monopile and jacket foundations, the distances to the behavioral threshold vary between species within the same hearing group. This may be unexpected given how exposure ranges are often calculated solely by hearing group. BOEM should explain the reason behind this variation (i.e., that exposure ranges are computed using the simulated movements of individual animals within each species group considered in the animal movement and exposure modeling). In addition, BOEM should correct the source information for Table 3.7-8 and Table 3.7-9.	Supportive information from the modeling report that is not in Section 3.7.2.3 is provided in Appendix B of the EIS. The calculation of exposure ranges takes into account the dosage of sound energy that modeled individuals accumulate during predicted swim and dive behaviors which are species-specific. Though the threshold is the same for all species, incorporation of individual species behavior in this exposure range method is more biologically accurate because it accounts for the received sound levels as animals move within the modeled sound field then computes the range at which each species meets the PTS threshold over thousands of model runs. A brief explanation of this modeling is provided in Section 3.7.2.3 of the EIS and EIS Appendix B Section B.4.2. Also, the source reference for Tables 3.7-8 and 3.7-9 have been fixed to refer to the correct tables in the COP modeling report from which this information was obtained.
0083-62	There are critical omissions from BOEM's sound exposure analysis presented in the Draft EIS that must be addressed in the Final EIS... estimates of the number of individual marine mammals that may experience injury (i.e., permanent threshold shift, PTS), temporary threshold shift (TTS), or behavioral disturbance are not included in the impacts analysis. As this information represents a key component of assessing the potential for impact, BOEM must incorporate this information into the Final EIS. Appendix III-M of the New England Wind COP provides exposure estimates for marine mammals... that could be included in the Draft EIS. For all marine mammals, and North Atlantic right whales in particular, it is unreasonable to make any determination of impact levels for IPFs that have large areas of potential PTS, TTS, and behavioral impacts (e.g., impact pile driving, vibratory pile driving, UXO detonations) without having an understanding of the number of individuals that could be affected.	The ranges to the thresholds that were modeled for this Project were provided in Section 3.7.2.3 of Draft EIS as well as in Appendix B for each activity modeled by the applicant. he 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

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		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).
0083-64	Within the Draft EIS, BOEM asserts that pile-driving activities will likely exceed PTS and TTS for all marine mammal functional hearing groups. We note that behavioral impacts resulting from noise exposure can also be significant and the best available scientific information on this matter is not incorporated into the Draft EIS. For example, BOEM states: "For marine mammals, assessing the severity of behavioral effects associated with anthropogenic noise exposure presents unique challenges due to the inherent complexity of behavioral responses and the contextual factors affecting them, both within and between individuals and species," but does not provide further analysis of what is known. Yet there are data available that BOEM should consider. For example, scientific information on North Atlantic right whale functional ecology shows that the species employs a "high-drag" foraging strategy that enables them to selectively target high-density prey patches, but is energetically expensive. Thus if access to prey is limited in any way, the ability of the whale to offset its energy expenditure during foraging is jeopardized. Researchers have concluded: "right whales acquire their energy in a relatively short period of intense foraging; even moderate changes in their feeding behavior or prey energy density are likely to negatively impact their yearly energy budgets and therefore reduce fitness substantially." North Atlantic right whales are already experiencing significant food stress: juveniles, adults and lactating females have significantly poorer body condition relative to southern right whales and the poor condition of lactating females may cause a reduction in calf growth. A recent study confirmed that larger females do, indeed, have more calves. These studies provide an indication of the significant impact disturbance during foraging may have on a marine mammal species.	Assessment of behavioral impacts from pile driving based on available published literature is discussed in Section 3.7.2.1 of the EIS, and the assessment based on results of the modeling is discussed in Section 3.7.2.3. The Final EIS and associated appendices provide significant input regarding behavioral disturbance and consequences for marine mammals, including NARWs. While the Draft EIS asserts that noise levels produced by pile driving will exceed PTS and behavioral thresholds, mitigation measures are designed to eliminate the risk of PTS exposures being realized and minimize behavioral exposures which could lead to prolonged changes in biologically relevant behaviors. In the case of NARWs, they are not expected to be feeding during the pile driving window as pile driving would not occur between January 1 and April 30 when NARW are expected to have a heightened abundance in the SWDA; therefore the risk of disturbing critical foraging activity is very low. An additional statement to clarify this point and how the seasonal restriction on pile driving activities would help mitigate behavioral disturbances, and not just PTS, has been added to Section 3.7.2.3 of the Final EIS to clarify.
0083-65	"[U]nder the noise analysis for marine mammals for the Proposed Alternative, high- resolution geophysical (HRG) surveys are afforded only a paragraph and impacts based on the impacts assessment and mitigation measures found in the 2021 BOEM Biological Assessment (BA). We have profound concerns with the 2021 BOEM BA, and the programmatic informal consultation it supports, because it relies on grossly outdated scientific information about the right whale and fails to include mitigation measures that meet the ESA's requirements...	Section 3.7.2.1 of the Final EIS has been updated to include more recent references studying effects of HRG surveys on marine mammals including Ruppell et al. (2022), Kates Varghese et al. (2020, 2021), Cholewiak et al. (2017), and Quick et al. (2017) to provide a more up to date assessment of potential risks. Section 3.7.2.3 also refers to the information in this section but has been updated to rely more on the take assessment available in the Project's final LOA application rather than the 2021 BOEM BA.

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0083-75	"BOEM proposes a four-month seasonal restriction on impact pile driving from January 1 through April 30 to minimize impacts to North Atlantic right whales. However, these dates do not reflect the best available scientific information for the Project Area and broader region where right whales are often detected outside of this period. Since 2010, the distribution and habitat use of North Atlantic right whales and other large whale species off the U.S. East Coast has shifted in response to climate change-driven shifts in prey availability. Best available scientific data indicates that North Atlantic right whales now rely heavily on the waters within, and in the vicinity of, the New England Wind Project Area year-round, and that this area is increasing in habitat importance for the species. A recent scientific study led by the New England Aquarium analyzed data collected during systematic aerial surveys conducted within the offshore wind energy development area off Southern New England, as well as from across the broader region. The resulting multi-year data set enabled a comparison between two different time periods (2013-2015 and 2017-2019) to assess trends in abundance of right whales in the region in the winter and spring. The study confirmed a growing understanding that the number of right whales using habitat off Southern New England—known to be a historic whaling ground—in the winter and spring significantly increased between 2013 and 2019. Right whales were also detected during every season surveyed from 2017 to 2019. Confirmed year-round detection is unique among major right whale habitats. During these surveys, right whales were also observed feeding and socializing in groups. The authors conclude that their results, when interpreted alongside previous studies, "suggest that [Southern New England] represents an increasingly important habitat for the declining right whale population." Scientific analysis comparing the NLPSC aerial survey campaigns conducted in 2011-2015 with those conducted in 2017-2019 also show that right whales have been sighted in nearly every month since 2017, with peak sighting rates between late winter and spring. Modeling suggests that 23 percent of the population is present from December through May each year, and that mean residence time has tripled to an average of 13 days during these months. A total of 327 unique right whales were identified during the combined survey effort off Southern New England between March 2011 and December 2019; by the end of 2019, 87 percent of the then living population had been sighted. All demographic classes of right whales have been documented in or near the Project Area and the age- ratio of the whales using the area is reflective of the species. Both reproductive females and conceptive females have been seen in the study area...Undisturbed access to foraging habitat is therefore necessary to adequately protect the species, as is the	The importance of Nantucket Shoals is described in Section 3.7.1.2 of the Final EIS and has been updated with the best available data regarding NARW presence and use of this region. Additionally and in addition to the time of year restrictions, all mitigation measures during construction and O&M will be implemented regardless of season. Therefore, there is no decrease in mitigation measures during periods of lower NARW abundances. 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).

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	minimization of disturbance during the species' energetically expensive migration.	
0083-79	Clearance and Exclusion Zones Are Under-Protective NMFS', and thus BOEM's, reliance on a 160 dB (re 1 ?Pa2s) threshold for behavioral harassment is not supported by the best available scientific information and such reliance grossly underestimates Level B take. As previously noted, behavioral disturbance of right whales must be minimized to the greatest extent possible if the species is to be adequately protected. Establishing Clearance and Exclusion Zones and monitoring those areas for the presence of marine mammals... is one of the primary means of reducing acoustic exposures of these species during impact pile driving. BOEM sets out several Clearance and Exclusion Zones for North Atlantic right whales to be implemented at different time periods in Appendix H of the Draft EIS (we encourage BOEM to also include this important information on monitoring and mitigation in the main text of the Final EIS). However, except for two short periods from November 1 through December 31 and from May 1 through May 14 where a 10 kilometer Exclusion Zone is required, the sizes of these zones are insufficient. For impact pile driving with a minimum noise reduction/attenuation level of 10-12 dB (re 1 ?Pa2s), as intended by the New England Wind Project, the following minimum Clearance and Exclusion Zone distances should be required for North Atlantic right whales... 1). A visual Clearance Zone and Exclusion Zone must extend at minimum 5,000 m in all directions from the location of the driven pile. 2. An acoustic Clearance Zone must extend at minimum 5,000 m in all directions from the location of the driven pile. 3. An acoustic Exclusion Zone must extend at minimum 2,000 m in all directions from the location of the driven pile. In addition, Clearance and Exclusion Zone distances for other marine mammal species are extremely small relative to the size of the zone of potential impact. ....mysticete whales other than the North Atlantic right whale are afforded a 500-meter exclusion zone, harbor porpoise only a 120- meter exclusion zone, and all other species only a 50-meter exclusion zone. It is unclear if pre-start Clearance Zones for these species will be required. BOEM should revise the required Clearance and Exclusion Zones, increasing their size in a manner that eliminates Level A take and minimizes behavioral harassment to the fullest extent possible for all marine mammal species...	Appendix H of the Final EIS has been updated to more clearly indicate the mitigation zones that will be implemented for this project based on the modeling and the Project's final LOA application. The proposed mitigation for this Project includes one seasonal exclusion period from January 1 to April 30, and the clearance and shutdown zones have been identified by species group and foundation type for pile driving activities as indicated in the updated Appendix H. Additionally, the proposed mitigation includes a PAM plan that will be developed in detail prior to the start of construction, but will aim to acoustically monitor a minimum radius of 5,500 m around each monopile foundation and 4,490 m around each jacket foundation to support the visual monitoring conducted by PSOs. For NARW specifically, the proposed mitigation includes a clearance zone at any distance at which NARW can be detected, and a shutdown zone around all pile types at any distance at which NARW can be detected.
0083-79	Clearance and Exclusion Zones Are Under-Protective NMFS', and thus BOEM's, reliance on a 160 dB (re 1 ?Pa2s) threshold for behavioral harassment is not supported by the best available scientific information and such reliance grossly underestimates Level B take. As previously noted, behavioral disturbance of right whales must be minimized to the	"Appendix H of the Final EIS has been updated to more clearly indicate the mitigation zones that will be implemented for this project based on the modeling and the Project's final LOA application. The proposed mitigation for this Project includes one seasonal exclusion period from January 1 to April 30, and the clearance and shutdown zones have been

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0083-118	We recommend that BOEM... Revise the sound exposure analysis for marine mammals... and include all information necessary to inform BOEM's impact analysis in the Draft EIS... Extend the time period of the prohibition on impact pile driving to December 1 through April 30. Prohibit commencement of impact pile driving during periods of darkness or poor visibility. Strengthen noise reduction and attenuation requirements to reflect best available control technology. Include mitigation measures to reduce impacts from unexploded ordinance (UXO) removal.	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

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		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).
0083-119	We recommend that BOEM... Require a mandatory, year-round 10-knot speed restriction on all Project-associated vessels at all times [to reduce impacts to marine mammals].	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).
0083-131	BOEM misrepresents several estimates of seasonality and occurrence of marine mammals... in the Project Area, and these inaccuracies should be corrected in the Final EIS... Peak occurrence for right whales is designated for spring, but winter is also a peak time for this species based on survey data and derived habitat-based density models and acoustic data, and is identified as such in other parts of the Draft EIS. Similarly, peak occurrence for the humpback whale is listed as spring-summer, but higher abundances for this region have been modeled for fall and the densities listed in the Draft EIS are highest for this species during	BOEM acknowledges that there are seasonal fluctuations in marine mammal movements and the climate changes are likely to produce more fluctuation. While short-finned pilot whales have been documented off New England, their occurrence is still considered rare based on best available data (Section 3.7.1.2, Table 3.7-1 of the Final EIS). Based on the definitions for species occurrences provided in this Final EIS and the most recent survey data (e.g., as summarized in the NMFS SARs and additional reports), occurrences of both pilot whale species remain unchanged in Table 3.7-1. Peak occurrences for NARW and humpback whales have

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	September.... Both pilot whale species should be expected to occur in the Project Area based on the uncertainty of the exact ranges of these species, the potential for range shifts due to climate change, and the difficulty distinguishing between these species in the field. Tagged short-finned pilot whales have ranged along the shelf break as far north as Nantucket Shoals and Georges Bank.	been updated in Section 3.7.1.2, Table 3.7-1 of the Final EIS per the referenced density data.
0083-132	BOEM misrepresents several estimates of seasonality and occurrence of marine mammals... in the Project Area, and these inaccuracies should be corrected in the Final EIS... Sei whale occurrence should be listed as year-round based on known occurrence in nearby shelf regions (e.g., surveys of the New York Bight recorded sei whales during August, February/March, and April/May).	BOEM acknowledges that there are seasonal fluctuations in marine mammal movements and climate change is likely to cause more fluctuation. Sei whale occurrence has been reviewed, and Section 3.7.1.2, Table 3.7-1 of the Final EIS has been updated.
0086-09	Nantucket Sound is home to aquatic biodiversity. BOEM states that "38 marine mammal species• including the critically endangered North Atlantic right whale (NARW) "are known to occur year-round, seasonally, and/or incidentally on the Northwest Atlantic."...Knowingly choosing a cable landing at Dowses Beach - in spite of prior knowledge of the critically endangered NARW's Nantucket Sound habitat• would be in direct opposition to President Biden's EO to conserve aquatic biodiversity.	Thank you for your comment.
0086-17	Very loud noises come from pile driving, during OSW construction and are severely detrimental to marine life. Marine scientist Daniel Costa states that anthropogenic ·underwater noise can cause animals to behave inappropriately and end up stranding on a beach and dying as "has happened to beaked whales." We wonder if this noise pollution is disorienting the whales washing up on the New Jersey beaches, It is hard to reconcile BOEM's conclusion that there would only be "moderate impacts on marine mammals." II would stand to reason that a marine animal's death is "permanent" and would thus have a "major adverse impact."	The potential impacts associated with underwater noise such as shipping and pile driving on marine mammals is discussed Sections 3.7.2.1 and 3.7.2.3 of the Final EIS. The noise produced by offshore wind construction and operation and maintenance activities are not expected to significantly increase the overall shipping noise in the region.
0095-5-01	ere on the southern part of Long Island, just off the Shinnecock reservation, over the past 90 days we have had 90 large whales beach...In evaluating reasons why we have -- although I have not observed the whales myself, reports are suggesting that there is some abuse of the whale, but nothing that would suggest attacks from aquatic enemies. More a banging and bruising type of effect. There is only one thing that -- that's out there that indeed could cause this type of situation. And that's sonic -- the use of sonic waves. And we all know that sonic systems are currently being used to map the bottom.	Based on necropsy current reports, the recent whale stranding on NY and NJ beaches are predominately the result of vessel strikes; and many are from unknown causes. Noise sources resulting from offshore wind development is from high resolution geophysical surveys and geotechnical surveys. These noise sources do not produce enough acoustic energy within the frequency of marine mammal (particularly large whale) hearing to result in auditory injury or non-auditory injury. Additionally, all wind-based activities are required to have trained lookouts who must report all whale, dolphin, and sea turtle detections to NMFS, and to date there have been no vessel strikes of marine protected species resulting from any wind survey activities. The vessel strikes are not known to be correlated with any anthropogenic noise; but rather are attributed to large

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		numbers of vessels in areas that overlap with foraging and migrating whales.
0096-2-01	In the last few years, whales stranded on beaches of the East Coast have become common...NOAA declared an official, unusual mortality event for humpback whales in 2016 when the number of deaths on the East Coast, more than doubled from the average and previous years. Coincidently, that is the same year when offshore wind development began, which coincides with a huge jump in NOAA incidental harassment authorizations. They claim that this jump in mortality predates offshore wind preparation activities is patently false. This strong correlation is strong evidence of causation, especially since no other possible cause has appeared.	Based on necropsy current reports, the recent whale stranding on NY and NJ beaches are predominately the result of vessel strikes; and many are from unknown causes. Noise sources resulting from offshore wind development is from high resolution geophysical surveys and geotechnical surveys. These noise sources do not produce enough acoustic energy within the frequency of marine mammal (particularly large whale) hearing to result in auditory injury or non-auditory injury. Additionally, all wind-based activities are required to have trained lookouts who must report all whale, dolphin, and sea turtle detections to NMFS, and to date there have been no vessel strikes of marine protected species resulting from any wind survey activities. The vessel strikes are not known to be correlated with any anthropogenic noise; but rather are attributed to large numbers of vessels in areas that overlap with foraging and migrating whales.
0096-2-02	If what we're seeing is what happens during the surveying process for an offshore wind farm, we can only imagine what will happen when major construction begins. If vessel strikes are a leading cause of death, why on earth would we diminish habitat and increase vessel traffic with the construction of wind turbines?...We certainly should not be increasing vessel traffic at this time. We should be restricting it. Vessel strikes and ocean noise from these extra ships and their sonar mapping is killing whales.	Based on necropsy current reports, the recent whale stranding on NY and NJ beaches are predominately the result of vessel strikes; and many are from unknown causes. Noise sources resulting from offshore wind development is from high resolution geophysical surveys and geotechnical surveys. These noise sources do not produce enough acoustic energy within the frequency of marine mammal (particularly large whale) hearing to result in auditory injury or non-auditory injury. Additionally, all wind-based activities are required to have trained lookouts who must report all whale, dolphin, and sea turtle detections to NMFS, and to date there have been no vessel strikes of marine protected species resulting from any wind survey activities. The vessel strikes are not known to be correlated with any anthropogenic noise; but rather are attributed to large numbers of vessels in areas that overlap with foraging and migrating whales.
0096-2-03	More industrial development by the installation of thousands of offshore wind turbines will not solve the problem of climate change. There's one inescapable truth about the headlong rush to cover vast sloughs of our countryside and oceans with 600-foot wind turbines and that is that more turbines get built, the more wildlife will be harmed or killed, and no amount of greenwashing can change that fact.	Thank you for your comment.
0097-3-02	For the Right Whale, the potential of loss of one species is the difference between survival and extinction. So BOEM is basing its conclusions in the Draft EIS on false analysis that offshore wind turbines will reduce climate change. They will not. It makes no sense to increase whales when they are suffering through an unusual mortality event.	Thank you for your comment.

O.5.7 Sea Turtles

Table O.5-7: Responses to Comments on Sea Turtles

Comment Number	Comment	Response
0029-18	Light pollution is another adverse OSW impact on marine life especially to sea turtles. BOEM states that "Artificial light pollution, particularly near nesting beaches is detrimental to sea turtles because it alters critical nocturnal behaviors; namely their choice of nesting sites, their return path to the sea after nesting, and how hatchlings find the sea after emerging from their nests." Given that the sea turtles are already endangered, along with the critically endangered NARW, BOEM cannot justify approval of CW to be on Nantucket Sound. What is most important to note is that this light pollution is going to go on for as long as the OSW project is in the area. BOEM mentions construction, operations and decommissioning activities. But OSW maintenance activity would be a contributing light pollution factor, and must be considered by BOEM.	Section 3.8 of the Draft EIS addressed artificial lighting. Additionally, there are no sea turtle nesting areas in the vicinity of the proposed Project (as discussed in Section 3.8.1.3 of the Draft EIS). Therefore, lighting as a result of the Proposed project will have no impact on nesting sea turtles.
0083-15	There are critical omissions from BOEM's sound exposure analysis presented in the Draft EIS that must be addressed in the Final EIS... the noise analysis for sea turtles should include estimates for each of the sea turtle species likely to be affected. Distances over which effects on sea turtles are expected were calculated, and predicted exposures are included in the New England Wind COP, so it is unclear why BOEM chose not to include this information in the Draft EIS. Acoustic exposure estimates are critical to making an impact level determination and BOEM should include this analysis in the Final EIS.	The modeled acoustic exposure estimates from the Project's COP have been added to Appendix B of the Final EIS.
0083-16	There are critical omissions from BOEM's sound exposure analysis presented in the Draft EIS that must be addressed in the Final EIS... the Draft EIS's description of potential noise effects from operational WTGs is also cursory and does not provide any analysis of sound source levels compared to thresholds or ambient noise. Instead, it is merely compared to vessel noise, which is not an appropriate comparison because vessel noise consists of moving, ephemeral noise sources not laid out in a permanent grid like what is proposed for New England Wind. A wealth of research exists on the impacts of operational noise from offshore wind turbines on marine life and the importance of reducing this impact. Best available scientific information indicates that, during the operation phase, offshore wind turbines may generate noise audible and potentially impactful to large whales and other marine species [including sea turtles] over significant distances. Understanding levels and impacts of operational noise should be an immediate research and monitoring priority for BOEM as the first offshore wind projects are constructed in	Section 3.8.2.1 of the Final EIS includes a discussion on the WTG operational noise using available published research, and is further discussed as applicable to the Proposed Action in Section 3.8.2.3. While BOEM acknowledges that offshore wind operational noise monitoring is a key data collection goal, there is not a wealth of research and empirical data regarding the sound field produced by WTGs or its perception by and potential impacts to marine species. Data that have been published can lend some information but are not fully comparable to the operations, or species, that will be conducted in the US. Data are also often conflicting in the published science owing that site conditions and local acoustic environment likely have a significant role in understanding potential WTG noise impacts.

Comment Number	Comment	Response
	the United States. The Final EIS should include a proper, quantitative analysis that considers the operational noise generated by turbines.	
0083-17	There are critical omissions from BOEM's sound exposure analysis presented in the Draft EIS that must be addressed in the Final EIS... The acoustic impact analysis presented in Appendix III-M of the New England Wind COP states that a noise abatement system (NAS) performance of 10 dB broadband attenuation was chosen for the study of acoustic impacts, but also notes that New England Wind expects to implement noise attenuation mitigation technology to reduce sound levels by approximately 12 dB or greater. A 12 dB target reduction is echoed in the mitigation and monitoring measures listed in Appendix H of the Draft EIS, which states that the applicant will implement noise attenuation mitigation to reduce sound levels by a target of approximately 12 dB or greater. However, in the sea turtle section, the Draft EIS states that the applicant has committed to a minimum of 6 dB of noise reduction from abatement. BOEM's analysis of noise impacts in the Draft EIS should clearly state what level of noise attenuation will be required so potential impacts to marine mammals can be accurately evaluated.	Section 3.8.2.3 of the Final EIS has been updated to clarify that the assessment assumes a minimum of 10 dB noise attenuation and the applicant will aim for greater noise reduction. Additional information to support this discussion is also available in Appendix B of the Final EIS.
0083-19	[I]n considering the potential for dredge and cable emplacement under the No Action Alternative, BOEM should not equate lower densities of sea turtles in open ocean environments with low risk of impacts from these activities on sea turtles. This is particularly true when these activities are taking place in nearshore areas where sea turtles densities are higher.	Section 3.8.2.1of the Draft EIS included the impact analysis for dredging and the potential effects on sea turtles. Although dredging activities presents a higher risk of impact to sea turtles in constricted and nearshore environments, sea turtles are generally not in high densities close to shore in the northeast as they are mostly foraging and traveling away from beaches. Therefore, no changes have been made.
0083-50	BOEM needs to summarize the data and information that has been collected during studies that overlapped with the Project Area (e.g., sightings data from the Atlantic Marine Assessment Program for Protected Species (AMAPPS), sightings and acoustic data from the Northeast Large Pelagic Survey Collaborative studies, Protected Species Observer (PSO) data, etc.). We recommend that BOEM revise the description of the affected environment section to incorporate an independent analysis of all [sea turtle] species likely to occur in the Project Area, using relevant and up-to-date primary sources to support its analysis.	Species occurrence has been reviewed and revised; project-area specific occurrence discussion is provided in Section 3.8.1.2 using the best available data. Data sources for this assessment include: the Atlantic Marine Assessment Program for Protected Species (AMAPPS) surveys (Palka et al. 2017; 2021), Northeast Large Pelagic Survey Collaborative Aerial and Acoustic Surveys for Large Whales and Sea Turtles (Kraus et al. 2016a), Megafauna aerial surveys in the wind energy areas of Massachusetts and Rhode Island with emphasis on large whales: Summary Report Campaign 5, 2018-2019 (O'Brien et al. 2021a), and Megafauna aerial surveys in the wind energy areas of Massachusetts and Rhode Island with emphasis on large whales: Interim Report Campaign 6A, 2020 (O'Brien et al. 2021b). This is addressed in Section 3.8.1.2 of the Final EIS.
0083-53	BOEM misrepresents several estimates of seasonality and occurrence of... sea turtles... The description of relative occurrence should also include "Year-Round" for leatherback, loggerhead, green, and Kemp's Ridley sea turtles. While not as likely to occur during the winter, they may occur during the spring, summer, and fall with peak occurrence during summer	Species occurrence has been reviewed and revised (see Table 3.8-1 of the Final EIS); seasonal occurrence has been edited to reflect periods of heightened abundances, which does not preclude potential occurrences outside of those time periods. The terminology in this table has been modified to make this clearer.

Comment Number	Comment	Response
	and fall. Leatherback sea turtles become more numerous off the Mid-Atlantic and southern New England coasts in late spring and early summer, and by late summer and early fall, they may be found in the waters off eastern Canada. During Northeast Large Pelagic Survey Collaborative Aerial and Acoustic Surveys (NLPSC), loggerhead turtles were sighted within the Rhode Island/Massachusetts Wind Energy Areas (WEAs) during spring, summer, and fall, with the greatest number of observations in summer and fall. During recent surveys in the New York Bight, sightings of Kemp's ridley sea turtles were recorded during the spring, summer, and fall, and one green sea turtle was sighted during spring 2016. One confirmed sighting of a green sea turtle was also recorded in the Rhode Island/Massachusetts WEAs in 2005, and five green sea turtle sightings were recorded off the Long Island shoreline 10 to 30 miles (16 to 48 kilometers) southwest of the WEAs during AMAPPS aerial surveys conducted from 2010 to 2013.	
0083-54	Density Estimates for... Sea Turtles Require Clarification... For sea turtles, BOEM uses seasonal density estimates from the U.S. Navy Operating Area Density Estimate database (U.S. Navy 2007) and Kraus et al. (2016). But it is unclear in the Draft EIS how estimates from both sources were combined to provide one estimate per species per season. The public needs to instead consult Appendix III-M of the New England Wind COP for an explanation; the more recent data from Kraus et al. (2016) were used preferentially where possible, specifically for leatherback and loggerhead sea turtles in the summer and fall. There are limitations with each of these data sets, however. The Navy's density estimates are generated via modeling and are outdated as they are based on NMFS aerial survey data collected prior to 2005, and Kraus et al. (2016) provides sightings per unit effort (SPUE) estimates but not modeled density estimates and does not include sea turtle sightings from the more recent NLPSC surveys. The Navy is shortly expected to release updated sea turtle density models and is currently making this information available upon request to support agency decision- making. BOEM should request and use these updated models to derive density estimates for the Project Area.	Sea turtles densities specific to the Project area were obtained from the COP Modeling report which uses data from both the Navy NODE data (U.S. Navy 2012, 2017) and the northeast pelagic survey (Kraus et al. 2016a). The data from Kraus et al. (2016) was not available for all species/seasons in the same way that the Navy data were, but they were used preferentially where possible as they represent a more recent data set. The text in Section 3.8.1 of the Final EIS has been updated to clarify, and footnotes have been added to Table 3.8-2 to identify where densities are based on Navy data, Kraus data, or a combination of both.
0083-57	[In the Draft EIS] The overall impact for marine mammals and increased noise and vessel traffic is lowered based on timing restrictions and other mitigation measures specifically intended to avoid adverse effects on right whales. However, as discussed in Section II.C, our groups find the proposed mitigation measures inadequate. For those reasons and the reasons detailed below, the impact analysis for... sea turtles requires revision.	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

Comment Number	Comment	Response
		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).
0083-63	There are critical omissions from BOEM's sound exposure analysis presented in the Draft EIS that must be addressed in the Final EIS. While this information is included in the appendices to the New England Wind COP, BOEM should transpose all information critical to supporting its impact analysis into the Final EIS. ...in the model predicted exposure ranges for monopile and jacket foundations, the distances to the behavioral threshold vary between species within the same hearing group. This may be unexpected given how exposure ranges are often calculated solely by hearing group. BOEM should explain the reason behind this variation (i.e., that exposure ranges are computed using the simulated movements of individual animals within each species group considered in the animal movement and exposure modeling). In addition, BOEM should correct the source information for Table 3.7-8 and Table 3.7-9.	The predicted sound exposure modeling results from the COP are provided in Appendix B of the Final EIS. The calculation of sound exposure ranges takes into account the dosage of sound energy that modeled individuals accumulate during predicted swim and dive behaviors which are species-specific. Though the threshold is the same for all species, incorporation of individual species behavior in this exposure range method is more biologically accurate because it accounts for the received sound levels as animals move within the modeled sound field then computes the range at which each species meets the PTS threshold over thousands of model runs. The source references for Table 3.8-6 and 3.8-7 in Section 3.8.2.3 of the Final EIS have been corrected so they refer to the correct corresponding tables in the COP's modeling report.
0083-66	BOEM notes that up to 67 acres may be affected by dredging prior to cable installation but provides little analysis on the potential impacts to sea turtles. The type of dredging that will be required is not specified and so hopper dredging cannot be ruled out. Given the well-documented and severe impacts of hopper dredging on sea turtles, particularly during seasons with high sea turtle presence, any possibility of such activity could be a cause for concern. BOEM should therefore explicitly list possible dredging methods that New England Wind could use, analyze the risks and impacts of each, and, following the principles of using the maximum-case scenario of the project design envelope, use the maximum possible impact in their analyses and required mitigation measures.	The evaluation of dredging risks to sea turtles has been updated, and a discussion that includes the type and amount of expected dredging is now included within Section 3.8.2.3 of the Final EIS. 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

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		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).
0083-67	Given that ...sea turtles are at a relatively high risk of entanglement from both actively fished and displaced and abandoned fishing gear, as well as other marine debris, this IPF requires more detailed discussion in the Final EIS. The Northeast Monitoring and Assessment Program (NEAMAP) surveys, which the fishery surveys that will be implemented for New England Wind are modeled after, have a capture rate for sea turtles that is non-negligible. Based on the known impact rates for the NEAMAP surveys, BOEM should include estimates of the number of sea turtles that may be affected by the New England Wind surveys based on measures of survey effort, and provide an appropriate impact level determination.	Entanglement risks for sea turtles has been reevaluated and additional text incorporated into the evaluation of impacts for relevant IPFs (i.e., presence of structures and anchoring and gear utilization IPFs within Section 3.8.2.3). Further, the impact determinations have been re-assessed for the above referenced IPFs and updated to account for heightened entanglement risk to sea turtles.
0083-68	Given that ...marine mammals are at a relatively high risk of entanglement from both actively fished and displaced and abandoned fishing gear, as well as other marine debris, this IPF requires more detailed discussion in the Final EIS. The Northeast Monitoring and Assessment Program (NEAMAP) surveys, which the fishery surveys that will be implemented for New England Wind are modeled after, have a capture rate for sea turtles that is non-negligible. Based on the known impact rates for the NEAMAP surveys, BOEM should include estimates of the number of sea turtles that may be affected by the New England Wind surveys based on measures of survey effort, and provide an appropriate impact level determination.	Entanglement risks for sea turtles has been reevaluated and additional text incorporated into the evaluation of impacts for relevant IPFs (i.e., presence of structures and anchoring and gear utilization IPFs within Section 3.8.2.3). Further, the impact determinations have been re-assessed for the above referenced IPFs and updated to account for heightened entanglement risk to sea turtles.
0083-78	"Clearance and Exclusion Zones Are Under-Protective NMFS', and thus BOEM's, reliance on a 160 dB (re 1 ?Pa2s) threshold for behavioral harassment is not supported by the best available scientific information and such reliance grossly underestimates Level B take. Establishing Clearance and Exclusion Zones and monitoring those areas for the presence of ....sea turtles is one of the primary means of reducing acoustic exposures of these species during impact pile driving. ... However, except	Appendix H of the Final EIS has been updated to include the most up to date proposed mitigation from the Project's final LOA application. This includes a single seasonal restriction period on pile driving between January 1 and April 30 that will also indirectly benefit sea turtle species present during this period. The proposed clearance zones include a 1,200 m clearance zone for sea turtles around all foundation types, and a 500 meter shutdown zones for sea turtles around all foundation types. This

Comment Number	Comment	Response
	for two short periods from November 1 through December 31 and from May 1 through May 14 where a 10 kilometer Exclusion Zone is required, the sizes of these zones are insufficient. For impact pile driving with a minimum noise reduction/attenuation level of 10-12 dB (re 1 ?Pa2s), as intended by the New England Wind Project,... . .. Clearance and Exclusion Zone distances ..... are extremely small relative to the size of the zone of potential impact. Sea turtles ..... are afforded a 500-meter exclusion zone, ..., and all other species only a 50-meter exclusion zone. It is unclear if pre-start Clearance Zones for these species will be required. BOEM should revise the required Clearance and Exclusion Zones, increasing their size in a manner that eliminates Level A take and minimizes behavioral harassment to the fullest extent possible for all .... sea turtles.	was deemed appropriate by the results of the modeling as the maximum range to the PTS onset threshold during monopile installation for all sea turtle species with 10 dB noise attenuation was 170 m so a 500 m shutdown zone would sufficient cover this range. Pre-start clearance will be implemented for sea turtles. The proposed mitigation is expected to significantly reduce the risk of PTS such that no PTS for any species is likely to be realized during construction, and though it won't eliminate behavioral disturbances but it will minimize the risk and likely duration to avoid prolonged changes in behavior that could affect biologically relevant behaviors.
0083-120	We recommend that BOEM... Revise the sound exposure analysis for ... sea turtles and include all information necessary to inform BOEM's impact analysis in the Draft EIS... Extend the time period of the prohibition on impact pile driving to December 1 through April 30. Prohibit commencement of impact pile driving during periods of darkness or poor visibility. Strengthen noise reduction and attenuation requirements to reflect best available control technology. Include mitigation measures to reduce impacts from unexploded ordinance (UXO) removal.	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).
0083-121	We recommend that BOEM... Include an analysis of dredging methods' impacts on sea turtles, including any higher-risk methods still under consideration such as hopper dredging. Require a mandatory, year-round 10-knot speed restriction on all Project-associated vessels at all times.	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

Comment Number	Comment	Response
		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).
0083-122	We recommend that BOEM... [to reduce impacts to sea turtles] Require a mandatory, year-round 10-knot speed restriction on all Project-associated vessels at all times.	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).

Comment Number	Comment	Response
0083-130	Our groups have several general and specific concerns with BOEM's analysis of... sea turtle occurrence, abundance, and seasonality in the Project Area... the Draft EIS does not provide a comprehensive assessment of all... sea turtle species with common occurrence in the Project Area. BOEM provides minimal descriptions of general and Project Area-specific occurrence of individual species expected to occur in the Project Area... Information on species is scattered across pages and therefore difficult to find and assess. Descriptions of species-specific occurrence in the Project Area should be provided by BOEM as the agency responsible for assessing environmental impacts of the proposed activity, not by the developer or another agency. BOEM can certainly refer readers to these documents for more information, but still should provide a summary of such information to inform the public and its own analysis.	Section 3.8.1.2 of the Final EIS has been updated for the species occurrence numbers and the project-area occurrence. Given the page limit requirements for this EIS, only a brief overview of species can be provided in the Affected Environment section. More detailed information can also be referenced in the Project's Biological Assessment.

O.5.8 Commercial Fisheries and For-Hire Recreational Fishing

Table O.5-8: Responses to Comments on Commercial Fisheries and For-Hire Recreational Fishing

Comment Number	Comment	Response
0041-03	I also noticed that there are several instances where the effects offshore wind construction is compared to the effects of fishing. I think these assumptions are inappropriate within an offshore wind Draft EIS. As stated at the beginning of the Draft EIS, "This Draft Environmental Impact Statement (EIS) assesses the reasonably foreseeable impacts on physical, biological, socioeconomic, and cultural resources that could result from the construction and installation (construction), operations and maintenance (operations), and conceptual decommissioning (decommissioning) of a commercial-scale offshore wind energy facility and transmission cable to shore known as the New England Wind Project", NOT the fishing industry.	Commercial fisheries and the for-hire recreational fishing industries are considered socioeconomic resources for the purposes of the analysis in the Draft EIS and it is therefore appropriate to include them in the impact analysis.
0055-08	We are uncertain about which alternatives to recommend as least impactful to fisheries, fish species, and habitats. The South Coast Variant is not fully analyzed, making it difficult to compare the proposed action, C1, and C2.	Section 3.9.2.4 of the Draft EIS, noted that Alternatives C-1 and C-2 could have marginally lower impacts on commercial and for-hire recreational fishing than the Proposed Alternative. However, these differences in impacts would not result in meaningful different impacts that those of the Proposed Alternative. More information on the potential impacts associated with Project Alternatives C-1 and C-2 on commercial and for-hire recreational fisheries were addressed in Section 3.9.2.4.
0055-16	Table 3.9-3 of the main Draft EIS document includes average commercial fishing revenue data over many years. While this is helpful to gain a broad understanding of the level of revenue exposure in the lease area and cable routes, including data by year is most helpful, similar to what is provided in NOAA's Socioeconomic Impacts tool. This annual landings and revenue information is displayed in a poster in the virtual meeting room for 2008-2021, however, these same updated data do not appear in Appendix B or the main Draft EIS document. Fisheries revenues can fluctuate for a variety of reasons (changing fish distributions, change in fishing regulations, market factors, etc.); therefore, an average value and older data may not always accurately describe the recent economic value of the fishery.	The National Marine Fisheries Service data used to generate Table 3.9-3 was only provided as a total revenue by port over 12 years.
0055-33	The Draft EIS states that "The activity and value of fisheries in recent years are expected to be indicative of future conditions and trends" (page 3.9-5), which is presumed to inform Table 3.9-2, projected revenue exposure for all future Northeast leases by fishery management plan (page 3.9-21). We do not agree with this assumption. The Final EIS should more clearly indicate that this is an assumption made for the purposes of analysis; however, future fishery characteristics, including revenues, catches, and the spatial distribution of fishing effort, are uncertain. For example, climate change is impacting fish distributions, which in turn affects fisheries, including where	Section 3.9.1 of the Final EIS has been updated to provide clarifying language.

Comment Number	Comment	Response
	effort is most likely to occur (e.g., 7 Morley et al. 2018, Rogers et al. 2019, Tanaka et al. 2020) 3 . In addition, regulatory changes will likely be implemented to protect Atlantic Large Whales (especially the North Atlantic right whale) and Atlantic sturgeon. Furthermore, as indicated in the Draft EIS, offshore wind development will likely change where fishermen are able to fish and where NOAA Fisheries' surveys are able to be conducted.	
0055-34	Section 3.9 of the Draft EIS should be broadened to address all types of recreational fishing, not just for-hire fishing. The section purports to focus only on for-hire recreational fishing but also includes some information on private recreational fishing. There will be many similarities and some differences in terms of how party boat, charter, and private recreational fishing will be impacted by offshore wind energy development. Fully describing all types of recreational fishing in the same section of the document would make linkages between biological and fishery conditions easier to explain and understand.	Section 3.15 of the Draft EIS presented the potential impacts to private recreational fishing to avoid redundancy in Section 3.9.
0055-35	The Final EIS should more clearly describe the limitations of available recreational fishing data, especially the lack of precise data on fishing locations. For example, data on the locations of fishing effort are not collected for private recreational fisheries and have limited spatial precision for for-hire fisheries. These limitations pose challenges for determining which recreational fisheries will be impacted by this project and how. Rather than ignoring these data poor fisheries, the Final EIS should acknowledge the associated uncertainties.	Section 3.9 of the Final EIS has indicated an acknowledgement of the lack of spatially precise for-hire recreational fishing trips information. Section 3.15 of the Draft EIS presented the potential impacts to private recreational fishing to avoid redundancy in Section 3.9.
0055-36	The Final EIS should use the most recent data possible. Volume 1 and Appendix B of the Draft EIS includes several tables with data from 2008-2017 with Figure B.1-10 displaying data from 2001-2010 and vessel monitoring system density figures for squid, multispecies, scallop, surfclam/ocean quahog, pelagic, and herring from 2015-2016. VMS data through 2019 are available via the Northeast Ocean Data Portal. The Draft EIS includes multiple statements on fisheries based on different data sets and different years, without a clear explanation for this variation. In some cases, the data are quite outdated, especially considering that this document analyzes the impacts of a project that is unlikely to begin construction before 2024 at the earliest.	The most current and complete data sets possible were used for the analysis. There are limitations with many fisheries datasets resulting in different years/ranges being used for certain analyses.
0055-37	The Councils are concerned about the impacts of boulder removals required for cable installation, especially when done via "blunt plow used to push aside boulders" (page 3.5-18). The Draft EIS does not include detailed information on which boulders would be removed and how, and the expected impacts on fisheries and benthic resources. The Draft EIS states that "Large boulders along the route may need to be relocated, and some dredging may be required prior to cable laying …" but no further information is provided and the impact on fisheries is not discussed. We	At the current stage of the project, it is unknown which or how many boulders would need to be relocated. Once the cable route is chosen, the most reasonable and least-environmentally impactful boulder relocation method will be used.

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	recommend using grabs to relocate boulders as they have fewer impacts on benthic habitats than plows. The Final EIS should specify plow width and the size of the area that will be impacted. The nature of this impact is very different from dredging used to harvest seafood, and the scientific literature on fishing gear impacts is unlikely to provide a reasonable proxy for the impacts of boulder clearance plows. For example, fishermen attempt to avoid boulders to reduce the risk of costly damage to fishing gear, and the penetration depth of fishing gear is much less than a boulder clearance plow.	
0056-03	New England Wind 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. While this financial commitment is notable, it illustrates one of our biggest concerns related to the mitigation discussion, which is that the effects of offshore wind on the fishing industry are not geographic in nature. The up or downstream effects to shoreside businesses and the potential devaluation of these businesses are in the fishing ports themselves. This, coupled with ex-vessel landings, will be a major potential lost revenue that although complicated, must be defined appropriately. Financial support for initiatives to assist fishermen and local communities should be based on the locations of actual landings on a port-by-port, community-by-community basis regardless of state boundaries.	In addition to the $7.5 million to support Connecticut fishermen, the applicant has committed $26.5 million to support 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. More information on the applicant's funding for fisheries research and education and support for economic and community initiatives is addressed in Final EIS Appendix H, Table H-1.
0081-10	When analyzing potential impacts to commercial fishing under any of the alternatives proposed, the analysis necessarily needs to consider potential impacts to, and mitigation measures for, those shoreside businesses as well. BOEM's practice to date has been to incorporate mitigation measures under consideration as appendices or Record of Decision conditions rather than analyzing them fully as alternatives.	BOEM believes the economic exposure analysis presented is sufficient to properly analyze potential impacts to commercial and for-hire recreational fishing from the proposed project.
0081-14	From discussions with leaseholders in other project areas, it is RODA's understanding that technical constraints may be realized after Draft EIS completion that make the Proposed Actions unfeasible. Yet, it is still the project design that all other alternatives are compared against. BOEM does not provide a comparison of alternatives for commercial fisheries which would provide some information about the differences between the various alternatives. This should be informative and describe what fisheries would be more or less impacted.	Section 3.9 of the Draft EIS presented a detailed discussion and comparison of alternatives.
0081-23	Concern remains about the datasets utilized in the Draft EIS to reflect commercial fishing activity in and around the Project Areas. The Draft EIS utilizes VMS datasets from 2014 - 2019. We appreciate acknowledging changes that happened to the fishing industry resulting from Covid-19.We recommend extending the VMS dataset coverage for at least 10 years prior to 2014. This would allow a more informed analysis of those commercial fisheries that are required to utilize VMS.	It is acknowledged that additional VMS data would allow for a more informed analysis. However, VMS data prior to 2014 is difficult to obtain. VMS data from 2014 to 2018 provides an adequate snapshot of vessel movement in the SWDA for the purposes of impact analysis.

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0081-24	"In 2019, commercial fisheries harvested more than 1.1 billion pounds of fish and shellfish in the Middle Atlantic and New England regions, for a total landed value of over $1.9 billion." (Draft EIS p. 3.9-1) While this (ex-vessel revenues) shows the economic benefits to the fishing vessels, it does not account for any downstream economic activity. Failing to identify, quantify, and assess these downstream impacts is a flaw in the Draft EIS analysis.	BOEM believes the economic exposure analysis presented is sufficient to properly analyze potential impacts to commercial and for-hire recreational fishing from the proposed project.
0081-25	In addition to analyzing economic impacts, the Draft EIS fails to undertake an analysis of the impacts to jobs in the commercial fishing/seafood industry.	BOEM believes the economic exposure analysis presented is sufficient to properly analyze potential impacts to commercial and for-hire recreational fishing from the proposed project.
0081-26	The commercial fishing revenue information provided needs to be put in context. There are many small businesses reliant upon access to fishing grounds within the lease areas and have developed business plans and made investments over the years with the expectation of utilizing those grounds...The Draft EISs fail to fully address the impacts that the projects will have on small businesses, which will include the vast majoring of fishing companies and supporting businesses. Fishermen and the fishing industry have reiterated time and time again that it is not easy for adaptation to occur because serious economic investments and management restrictions can make it prohibitive. The impacts to fishing and processing jobs must not be diminished in the Draft EIS analysis.	BOEM believes the economic exposure analysis presented is sufficient to properly analyze potential impacts to commercial and for-hire recreational fishing from the proposed project.
0081-27	As recommended by the U.S. Small Business Administration for Fisheries Mitigation Guidance, BOEM must conduct a Regulatory Flexibility Act (RFA) analysis of its proposals, including this Draft EIS, to adequately understand the impacts of offshore wind development activities on small businesses. Improved data and analyses of impacts to commercial fishing businesses, port infrastructure serving the fishing industry, port operators, marine equipment retailers, onshore processors, fish markets, and other fishing industry representatives, should inform mitigation strategies.	BOEM believes the economic exposure analysis presented is sufficient to properly analyze potential impacts to commercial and for-hire recreational fishing from the proposed project.
0083-129	In lieu of its own analysis, [in the Draft EIS] BOEM largely refers the public to secondary sources, including Section 6.7 (Vol. III) of the New England Wind COP and Appendix B of the Draft EIS. Not only is this information difficult to access, but it also contains outdated or incomplete information. For example, Section 6.7 of the COP relies on the National Marine Fisheries Service (NMFS) 2021 draft stock assessment reports (SARs) however, NMFS has published two SARs since then: the final 2021 SAR and the draft 2022 SAR, both of which BOEM should include in the Final EIS.	The occurrence of marine mammals in the Project area is addressed in Final EIS Section 3.7.1.2, Table 3.7-1, page 3.7-6 footnote 'c', which is based on best available data from the most recent NMFS stock assessment reports (SARs) and published literature.
0085-05	also request that BOEM analyze the New England Wind lease areas with the NCCOS "Suitability Model," that Mr. James Morris, a marine ecologist at NOAA/National Centers for Coastal Ocean Science (NCCOS) to deconflict areas of the Gulf for leasing. We request a full analyzation of the lease area	Section 3.13 of the Draft EIS addressed navigation and vessel traffic impacts, including cargo vessels, military vessels, fishing vessels, and recreational vessels and impact analyses for fisheries, natural resources,

Comment Number	Comment	Response
	and how using the Suitability Model would have the ability to deconflict the New England Wind lease area in a way that could better protect fishermen, USCG Search and Rescue and Scientific Research Surveys. Including but not limited to analyzing the lowest potential for use conflict and environmental impacts based upon a series of preordained criteria. Examples of data layers that should be included as suitability sub-models should include national security considerations, industry and operation activities, natural resources, fisheries use, and marine mammal protection.	and marine mammals were addressed in Sections 3.9, 3.4, and 3.7, respectively, of the Draft EIS.
0085-06	the economic consequences and comparative risks to New York's commercial fishermen if no transit lanes are available to reach fishing grounds directly or travel safely back to ports in New York instead of being forced to travel around wind lease areas due to faulty radar that is because of the wind turbines themselves. This must be re-analyzed and released as a supplemental Draft EIS.	Section 3.9 of the Draft EIS addressed navigation risks for commercial fishing vessels.
0095-6-01	what is "up to major impact" as it was stated on fishing? I'm not sure if there is major impact. And what part of it -- if not, what part of it is only moderate. All indications I've heard from listening to people on the East Coast is that it will be a major impact.	Section 3.9 of the Draft EIS presented a detailed impact analyses and discussion of the potential effects on commercial and for-hire recreational fisheries.
0097-1-01	I, like a lot of the fisheries people, are real worried about what it's going to look like with turbines out there and fishing boats trying to get out there also. I see a potential for a large amount of displacement.	Section 3.9 of the Draft EIS presented a detailed discussion of potential Project impacts on commercial and for-hire recreational fisheries traffic and their potential transit routes through and around the SWDA.
0097-5-01	Four years ago myself and another commercial fisherman attended numerous offshore wind meetings to see how this new offshore wind industry would impact us. After many hearings we went to Northern Ireland, Kilkea, to talk firsthand with some European fisherman how offshore wind affected their fishing and opportunities afforded to them. They have had success on both sides. Fishing is stable. Their boats work year round.	Thank you for your comment.
0097-5-02	For the past three years Sea Service North America has provided commercial fishing scout and safety vessels for offshore wind. We have completed thousands of miles of scouting with no issues of gear knockdowns and interactions between research boats profiling the bottom and commercial fishermen, lobstermen, crab fishermen, and it's been this success that these scout vessels have provided that have provided further opportunities to commercial fisherman as safety guard vessels. These contracts will supplement fishermen's revenue that have been offset by regulations and quotas.	Thank you for your comment.

O.5.9 Cultural Resources

Table O.5-9: Responses to Comments on Cultural Resources

Comment Number	Comment	Response
0083-47	The development of offshore wind and associated structures has the potential to directly affect archaeological resources, architectural resources, or traditional cultural properties, and the protection of these cultural resources is managed under the National Historic Preservation Act (NHPA)... While the NHPA does not require it, consultation with all state-recognized tribes who may have resources that could be potentially affected by the Project would help ensure that the environmental justice goals of the Administration are advanced.	Section 106 of the NHPA, 54 U.S.C. 306108 and 36 CFR part 800 (Section 106) requires that federal agencies consult with any Native American tribe that may be affected by the agency's undertakings. The United States acknowledges federally recognized tribes as sovereign nations; thus, federal government interaction with federally recognized tribes takes place on a "government-to-government" basis. Legally, there is a distinction between tribes that are federally recognized and those that are not. Public comments are also gathered as a part of the scoping process and there are several chances and forums in which the public can provide input on a project.

O.5.10 Demographics, Employment, and Economics

Table O.5-10: Responses to Comments on Demographics, Employment, and Economics

Comment Number	Comment	Response
0008-01	New England Wind will generate renewable power for the region, provide jobs, and help jumpstart an entire industry, enormously benefitting the South Coast of Massachusetts and the entire area.	Thank you for your comment.
0009-03	Massachusetts has the opportunity to become one of the centers of the offshore wind industry, making this industry a mainstay of the state's economy. New England Wind alone is expected to bring over 15,000 jobs to the region. Through partnerships with other companies, New England Wind plans: to invest $200 million to develop a full-scale cable manufacturing facility in Somerset; and to work with the City of Salem to transform Salem Harbor into an offshore wind marshaling port	Thank you for your comment.
0010-01	In a recent paper in the Proceedings of the National Academy of Sciences, scientists picked climate education as one of six (6) key societal transformations needed to address the climate crisis. While education in the K-12 science classroom is particularly important, so is job training and workforce development in the blue and green economy. This impact statement includes the expansion and enhancement of the blue and green economy workforce through job training, workforce development, and recruitment. Though this project is focused in Connecticut and Massachusetts, the state of Rhode Island only stands to benefit from development in the New England region as it paves a path for future projects in the Ocean State.	Thank you for your comment.
0019-04	The only real downsides I see to the Dowses cable landing site are the temporary traffic disruptions caused by the burying of cables between Dowses and the substation. That is a very small price to pay for all the benefits the project will bring, one of which is saving the town of Barnstable money on a planned sewer expansion by burying sewer pipes in the same trenches the cables will be in.	Section 3.11.2.3 of the Final EIS has been revised to address this comment.
0021-02	Please weigh the facts using science as well as economic data which also shows the offshore wind will bring sustainable jobs of the future to New England.	Thank you for your comment.
0022-02	Through host community agreements with the Town of Barnstable, AVANGRID could potentially put millions of dollars into community investment and local projects.	Thank you for your comment.
0023-12	The developer wants to exit a duct bank from the Dowses area onto narrow public roadways, advance it through settled neighborhoods and, if they are allowed to use their “preferred route,” directly through the village of Osterville’s vibrant business and professional center. The potential	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses

Comment Number	Comment	Response
	negative impact on the local economy and way of life is immeasurable. The village is one of Cape Cod's most sought after summer destinations, featuring many high-end residences, mid-level vacation rental properties, exceptional dining and shopping, and a significant year-round population of retired persons. At the heart of the village's appeal to residents and visitors is Dowses beach. Its temporary loss during construction and its permanent transformation into utility infrastructure would, without exaggeration, damage the appeal of this seaside community. The economic health of Osterville has ramifications well beyond the village center, as a significant professional, para-professional, and skilled-labor workforce depends on this seaside community for seasonal and year-round employment. Essentially, the village and surrounding population centers would bear the brunt of a multi-year, industrial scale construction project and the permanent transformation of its core asset. We ask BOEM to consider the socioeconomic fallout of a corporate decision made solely on the basis of ease and profit when far more appropriate options to deliver electricity to shore are available.	Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. The applicant's onshore construction schedule minimizes impacts to land uses to the greatest extent practicable limiting onshore construction activities during peak summer months and other times when demands on these resources are elevated. All disturbed areas at the landfall sites or other areas disturbed during installation of the onshore export cables and grid interconnection cables will be restored upon completion of construction. Onshore cable installation and substation construction would result in localized, short-term, and minor impacts on demographics, employment, and economics. Land disturbance during operations would be limited to infrequent unplanned repairs of underground cables.
0024-02	[New England Wind] will greatly boost our efforts to achieve a fossil fuel free economy, enhance the reliability and diversity of the regional energy supply, and is committed to helping our island of Martha's Vineyard reach our 100% renewable energy and fossil fuel reduction targets by 2040. New England Wind will bring critical power to the grid to help the region meet its collective, ambitious clean energy and climate goals, and at the same time create thousands of jobs and accelerate the nation's transition to a better, brighter clean energy future...... .....The New England Wind Project will generate up to 2,600 Mega Watts of renewable energy and will power over one million homes. The New England Wind Project is the equivalent of taking more than 800,000 gas powered cars off the road, reducing emissions by nearly 4 million tons of carbon dioxide annually, and provide power for more than one million homes. New England Wind will bring over 15,000 jobs to the region.	Section 1.2 of the Draft EIS provided the proposed Project's contribution to state renewable energy goals.
0027-01	Park City's proposition to construct and operate up to 129 wind turbines and up to five offshore electrical service platforms with a total of five offshore export cables will significantly enhance supply chain and workforce development. Additionally, the location of the project will maximize economic benefits to Massachusetts and surrounding areas...I am in full support of this project that will create career opportunities in this sector, benefit the offshore wind industry, and provide economic development to the region.	Thank you for your comment.
0028-04	Avangrid has indicated its willingness to work with the town of Barnstable to coordinate laying the onshore cable in conjunction with the town's installation of sewer lines along the proposed routes. Enabling the	Section 3.11.2.3 of the Final EIS has been revised to address this comment.

Comment Number	Comment	Response
	town to take advantage of the wind project's onshore cable construction work on roadways would save the town millions of dollars in municipal sewer construction costs. APCC enthusiastically supports efforts by Avangrid and the town of Barnstable to take advantage of the opportunity to install sewer lines along the proposed route, which would help accelerate the timeline for sewering sections of town that are in great need of municipal wastewater infrastructure to address the area's serious water quality issues.	
0029-02	Osterville where Dowses Beach is located, is a coastal community and a popular Cape Cod vacation getaway/destination. Many local businesses on Main Street thrive, with many visitors and locals enjoying the arts, dining, shopping and cultural offerings.	Section 3.11.2.3 of the Draft EIS addressed the impacts to the local economy and Section 3.15.2.3 discussed the impacts to tourism and recreation.
0032-04	the College supports this project and recognizes AVANGRID's commitment to workforce development and investment in host communities...The proposal mitigation measure (#37) addresses direct support for economic and community initiatives within Phase 1. This supports workforce development, supply chain integration, and offshore wind-related research. The Draft EIS recognizes the additional community and environmental initiatives to develop in connection with efforts to secure long-term contracts/power purchase agreements for the electricity generated by Phase 2. AVANGRID is clearly positioned well to become a responsible, sustainable economic driver for Southeastern Massachusetts and New England. With the availability of these direct support resources for related research, we strongly encourage AVANGRID to initiate a long-term planning strategy for the major maintenance, decommissioning, and replacement of the offshore wind infrastructure.	Section 1.2 of the Draft EIS provided the proposed Project's contribution to state renewable energy goals.
0034-08	Contrary to BOEM [a spill] does not have a negligible impact. That would mean the almost certain death of Osterville as a Cape Cod community as we now know it. It would render our real estate values, our homes nearly valueless. This means a loss of human habitat. That is a major adverse impact.	Sections 2.0 and 3.11 of the Draft EIS addressed the potential for spills.
0040-02	Financially...published analysis shows Avangrid Renewables' optimal contribution represents a .02 to .09 annual offset over 25 years. The Bureau of Labor Statistics currently shows the average new car costs $49,388.00. Would anyone consider a $445.00 new car discount "significant?"	Section 3.11 of the Draft EIS addressed the proposed Project's overall economic effects.

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0046-06	The impact to our small village roads and movement about town and the impact to the economy of our small businesses will be staggering. It will also be felt for years. The convenient landfall for Avangrid project is not going to be tolerated by the residents of Osterville Village and the interruption of essential services of fire, police and ambulances.	Section 3.11.2.3 of the Draft EIS addressed the impacts to the local economy and Section 3.15.2.3 discussed the impacts to tourism and recreation.
0067-04	The proposed Phase 1 and 2 of the New England Wind project are already directly contributing to the formation of a U.S. supply chain, and major investments are dependent on its advancement. Advancement of the New England Wind project would have direct impacts on the region's economy. Approximately 11,000 direct full-time equivalent (FTE) job-years are anticipated to be created during the life of the project for New England Wind Phase 1, with an additional 4,700 direct jobs and 210 indirect job-years for New England Wind Phase 2. In total, approximately 15,910 direct, indirect, and induced jobs are anticipated to be created during the life of both projects. The projects are expected to lead to the creation of jobs during operations. According to Avangrid's construction and operations plan, the estimated direct, indirect, and induced impacts of Phase 1 would result in $16.4 million in annual labor income and $17 million in annual expenditures during operations (COP Appendix III-L, Section III; Epsilon 2022a).	Thank you for your comment.
0067-08	The Network urges BOEM to focus on avoiding delay in project implementation that could threaten already challenged supply lines and postpone needed employment.	Thank you for your comment.
0067-11	The City of Salem MA and Crowley have received $75 million in state investments and $36.2 million in federal investments to upgrade the port of Salem to become a staging and marshalling port for offshore wind, an investment that would not have happened absent the Commonwealth Wind project agreement for use of the port. In addition, The Somerset/Brayton Point location in Massachusetts has received $25 million from the state to upgrade the facility for use in cable manufacturing by Prysmian. Similarly, the Bridgeport CT has seen a $10.5 million investment from the Federal government to prepare the port for use in the offshore wind industry. Also in Connecticut, the Department of Economic and Community Development awarded a grant of $4.5 4 million to the Southeastern Connecticut Enterprise Regional Corporation to focus on helping businesses in the offshore wind supply chain.	Thank you for your comment.
0068-05	Then a disruption of Wianno Avenue and small businesses that will lose money or have to close (as will mine) due to the destruction of one of New England's most beautiful little villages.*Will Avangrid pay for our beach permits??? Dowses Beach is used and visited year round! WE PAY THE TAXES....	Section 3.11.2.3 of the Draft EIS addressed the impacts to the local economy and Section 3.15.2.3 discussed the impacts to tourism and recreation.

Comment Number	Comment	Response
0070-02	Robust socioeconomic analysis is critical to achieve the maximum economic benefits from offshore wind projects. The Final EIS should detail, to the greatest extent possible, all anticipated job creation involving port utilization and development, supply chain and manufacturing of offshore wind components, construction, operations and maintenance, and decommissioning. In addition to salary, information should include health and safety, certifications, training pathways, recruitment and retention plans, project labor agreements and union neutrality commitments, and commitments and requirements for targeted hire of disadvantaged and underrepresented communities.	Section 3.11.1.7 has been revised to include information from the 2022 NREL offshore wind workforce study.
0072-02	Another reason we support the project is that AVANGRID is deeply committed to supporting local communities in our region. Through its current and proposed host community agreements and good neighbor agreements, AVANGRID is projected to pump tens of millions of dollars into community investment and local projects. Further, they will create thousands of jobs we need in Massachusetts in the coming years.	Thank you for your comment.
0079-02	This project represents investment in the Commonwealth through a partnership with Prysmian Group to invest $200 million to develop full-scale cable manufacturing facility at Brayton Point in Somerset. Locally, a partnership with Crowley Maritime and the City of Salem to transform Salem Harbor into an offshore wind marshaling port will bring economic opportunity to the area while redeveloping the site of a decommissioned coal plant.	Section 3.11.2.3 of the Draft EIS addressed the impacts to the local economy.
0082-03	In the Draft EIS under Section 2 Alternates, subsection 2.1.2.2, Onshore Activities and Facilities, (pp. 2-7 to 2-8) and in Figure 2.1-2 (p.2-9), Avangrid briefly references two variants for the onshore portion of the electric cables for Park City Wind. Avangrid has announced that it intends to use what it refers to as Variant 1, or its Preferred Route, instead of Variant 2. Variant 1 happens to be the shortest and cheapest option for Avangrid, but it also runs through the heart of the historic Main Street in the center of the Village of Centerville and has been opposed by both our village's civic association (the Centerville Civic Association) and the Town of Barnstable's Historical Commission. See the attached letters expressing opposition to Avangrid's selection of Variant 1 previously sent to Avangrid and BOEM, respectively. (See Attachments 2 and 3.)We ask that the BOEM require Avangrid to use Variant 2 for the onshore portion of the Park City Wind electric cable to connect to the proposed Shootflying Hill Road substation.	Section 2.1.2.3 of the Draft EIS and COP Volume I, Section 4.2.2.1 (Epsilon 2022a) describe the technical considerations underlying the Phase 2 OECR options. Section 3.11.2.3 of the Draft EIS describes the impacts of Phase 2 OECR construction and operation.

Comment Number	Comment	Response
0095-1-03	Massachusetts has the opportunity to become one of the centers of the offshore wind industry, making this industry a mainstay of the State's economy. New England Wind alone is expected to bring over 15,000 jobs to the region. Through partnerships with other companies, New England Wind plans to invest $200 million to develop a full scale cable manufacturing facility at Somerset. And to work with the City of Salem to transform Salem Harbor into an offshore wind marshaling port.	Section 1.2 of the Draft EIS described the purpose of and need for the proposed Project, which includes federal and state renewable energy goals.
0095-2-01	Investment in sound energy policy is a critical component to the region's health and prosperity. We hope that you do approve the New England Wind project and the policies and procedures that they need to put into place. We have heard, on more than one occasion, from economists throughout the State, that offshore wind is the number one way, and the number one economic drive, that will be coming to southeastern Massachusetts, going on for this -- the rest of our decade and for the rest of this century...we are also looking at how local businesses can benefit from the offshore wind industry and also that there could be great careers made in our region because of the industry.	Thank you for your comment.
0095-4-02	The expansion of this industry over the next decade could also create tens of thousands of high quality jobs through the establishment of the domestic work force and its supply chain. And of course with the right policy and planning, this also has the potential to drive equitable access to economic opportunity with those jobs, and building wealth in communities that have been historically underserved in our region.	Thank you for your comment.
0097-2-01	We believe you must take the environmental and socioeconomic impacts of cable landings as discussed in the project proposal before you as seriously as you take construction plans on the OCS.	Section 3.11.2.3 of the Draft EIS addressed the socioeconomic impacts of Phase 2 cable landing and OECR construction. Other Draft EIS sections address environmental impacts of these activities.

O.5.11 Environmental Justice

Table O.5-11: Responses to Comments on Environmental Justice

Comment Number	Comment	Response
0023-13	Of special note are the social impacts the proposed construction at Dowses would have on the handicapped members of the Barnstable community. Many individuals who are mobility-impaired rely on the handicap-accessible fishing pier built adjacent to the boat channel for access to the waterfront for fishing or simply for relaxation. This is of great importance to many Barnstable residents throughout the year. The developer’s plan to reserve a narrow corridor for public egress in the Dowses parking lot during some phases of the project is quite cynical given the noise, dust, and construction traffic visitors would have to endure. If the developer opts to trench the causeway, egress will be non-existent for an unspecified period of time.	Section 3.12.2.3 of the Final EIS has been updated to address this comment.
0029-17	[Air quality impacts] would impact the citizens’ well-being, threatening public health, contrary to President Biden’s EO14008.	Section 3.12.2.3 of the Draft EIS presented a discussions of the air emissions IPF and addressed the environmental justice impacts of the Project's air emissions.
0031-02	In President Biden's Executive Order 14008 (EO 14008), disadvantaged communities - "historically marginalized and overburdened" would be given economic opportunities to help them thrive. The South Coast has welcomed the OSW developers and sees benefits for its people including well-paying, long term jobs. Mayor Jon Mitchell wants New Bedford "to be known as a national hub" for supporting OSW. He sees "engineering, electrical, marine" jobs for his constituents. Bristol Community College has invested in a training facility (National Offshore Wind Institute) along the water that "will hire locals to become trainers, providing... skills and safety training." Locating CW in the South Coast would fulfill President Biden's executive order to economically uplift "hard hit communities" with the important benefit of giving the locals a sense of pride that they are helping tackle "the climate crisis at home."	Thank you for your comment.
0034-05	[Proposed alternative cable landing at New Bedford] also promotes environmental justice. In President Biden's Executive Order 14008 (EO 14008), disadvantaged communities - "historically marginalized and overburdened" would be given economic opportunities to help them thrive. The South Coast has welcomed the OSW developers and sees benefits for its people including well-paying, long term jobs. Mayor Jon Mitchell wants New Bedford "to be known as a national hub" for supporting OSW. He sees "engineering, electrical, marine" jobs for his constituents. Bristol Community College has invested in a training facility (National Offshore Wind Institute) along the water that "will hire locals to become trainers, providing... skills and safety training." Locating CW in the South Coast would fulfill President Biden's executive order to economically uplift "hard hit communities" with the	Section 2.1.2 describes the basis for selection of the proposed Project's route.

Comment Number	Comment	Response
	important benefit of giving the locals a sense of pride that they are helping tackle "the climate crisis at home."	
0034-06	Landing OSW cables on estuarine Dowses Beach and using the parking lot as a convenient staging area for Avangrid's multiyear industrial heavy machinery project would destroy the fragile natural beauty of Dowses Beach and would .. opposition to President Biden's EO [14008].	Figure 3.12-2 of the Draft EIS showed that Dowses Beach is not within an environmental justice community identified by the Commonwealth of Massachusetts.
0070-07	Offshore wind power could play a significant role in reducing pollution in our region. From 2013-2022, ISO-New England approved more than 5,200 MW of oil, coal, and nuclear plan retirements, and the organization says another 5,000 MW of coal- and oil-fired generation is "at risk" of retirement. It is imperative that we fill any gap in energy supply with clean energy...The co-benefit potential of reduced emissions is especially high for our most vulnerable communities, which are systematically overburdened by fossil energy pollution...It is crucial that states ensure a just transition of these power plants and that offshore wind projects foster the creation of high-quality, family-sustaining jobs.	Section 1.2 of the Draft EIS described the purpose of and need for the proposed Project, which includes federal and state renewable energy goals.
0074-06	President Joseph Biden, in his Executive Order 14008, calls for the protection of America’s coastal communities and its natural treasures. Protection of Nantucket Sound as a natural treasure and protection of Dowses Beach as a coastal community dovetail with President Biden’s executive order. There is nothing in EO 14008 that calls for the destruction of a pristine fragile coastal community to create renewable energy, or to sacrifice the biodiversity in natural treasure Nantucket Sound to OSW.	Figure 3.12-2 of the Draft EIS showed that Dowses Beach is not within an environmental justice community identified by the Commonwealth of Massachusetts.
0083-43	We also urge BOEM to pursue measures to ensure that any negative impacts to environmental justice communities are mitigated and that the many environmental and economic benefits offshore wind can provide communities are maximized. One way to do this is to ensure that project construction occurs in a manner that does not create a level of pollution at any one port that could have deleterious impacts to that community.	Section 3.12 of the Draft EIS addressed the potential effects on environmental justice.
0086-03	in President Biden's Executive Order 14008 (EO 14008), disadvantaged communities • historically marginalized and overburdened" would be given economic opportunities to help them thrive. The South Coast has welcomed the OSW developers and sees benefits for its people including well-paying, long term jobs. Mayor Jon Mitchell wants New Bedford "lo be known as a national hub" for supporting OSW. He sees "engineering, electrical, marine• jobs for his constituents. Bristol Community College has invested in a training facility (National Offshore Wind Institute) along the water that "will hire locals to become trainers, providing ... skills and safety training." Locating CW in the South Coast would fulfill President Biden's executive order to economically uplift "hard hit communities• with the important benefit of giving the locals a sense of pride that they are helping tackle "the climate crisis at home."	Section 2.1.2 of the Draft EIS described the basis for selection of the proposed Project's route.

O.5.12 Navigation and Vessel Traffic

Table O.5-12: Responses to Comments on Navigation and Vessel Traffic

Comment Number	Comment	Response
0029-20	How will the presence of large OSW structures affect the response time of the Coast Guard during a distress call on Nantucket Sound? How much difficulty will recreational boaters and commercial fishermen have navigating around such large OSW structures on Nantucket Sound? Could the presence of these OSW structures add to more distress calls?	Section 3.13.2 of the Draft EIS addressed this comment.
0076-06	BOEM claims that the 1x1 nm spacing is wide enough for safe transit. We disagree, particularly as regards the impacts of radar interference. However, BOEM continues to ignore the fact, even if 1x1nm spacing were safe, that the majority of transit through the lease areas is in a Northwest-Southeast direction and the turbine spacing in that direction is NOT 1x1 nm. In that direction, turbine spacing is less than 1x1 nm. Therefore, BOEM cannot argue that there is 1x1 nm spacing in the direction of transit. A transit lane is necessary.	Section 3.13.1 of the Draft EIS noted that the USCG's Final MARIPARS identified 1x1 nautical mile spacing as safe for vessel transit.
0085-04	With major effects/losses to commercial fishing, USCG Search and Rescue, and scientific research surveys, the cumulative economic losses and effects of all of three components must be evaluated and analyzed for New York's commercial fishermen in a way that does not rely upon AIS to determine who fishes in a lease area, since the majority of NY's commercial fishermen do not employ AIS and if they do have it, they turn it off when outside of 12 miles. AIS cannot be made a proxy for effort for New York's fishermen.	Section 3.13.1 of the Draft EIS discussed the USCG's Final MARIPARS and the EIS noted the finding that non-AIS vessel transit tracks did not vary significantly from AIS equipped vessels.

O.5.13 Other Uses (National Security and Military Use, Aviation and Air Traffic, Offshore Cables and Pipelines, Radar Systems, Scientific Research and Surveys, and Marine Minerals)

Table O.5-13: Responses to Comments on Other Uses

Comment Number	Comment	Response
0055-10	We appreciate that the Draft EIS mentions impacts to NMFS scientific surveys and the potential for increased uncertainty which "would increase uncertainty in stock assessments and quota setting processes" (page 3.9-22) and could result in "survey indices (that) could be biased and unsuitable for monitoring stock status" (Appendix B, page B-53). We also appreciate including information on demographics, employment, and references to onshore seafood sectors in Appendix B (page B-29).	Thank you for your comment.
0081-32	A finding of major impacts to scientific research and surveys (p. ES-17) cannot be downplayed and the proposed mitigation measures do not provide reassurance that our future understanding of the biological resources will not be gravely hindered. Any reduction of, or impact to, fisheries surveys will likely result in increased uncertainty for stock assessments, leading to changes to fisheries management and reduction in allowable catch. BOEM and NMFS must immediately work to implement strategic plans as soon as possible to minimize any 'lost time' between existing surveys and future adapted surveys.	BOEM has committed to working with NOAA to implement the Federal Survey Mitigation Strategy program (https://repository.library.noaa.gov/view/noaa/47925). As of February 2023, implementation is pending. As discussions between BOEM and NOAA on implementation of the program continue, specific details on appropriate mitigation measures will be added to the environmental analysis.

O.5.14 Recreation and Tourism

Table O.5-14: Responses to Comments on Recreation and Tourism

Comment Number	Comment	Response
0029-09	Let's also remember the people who live in and visit coastal Osterville. Wouldn't the [Dowses Beach landing site] installation impact their quality of life, depriving them of their daily health walks on the beach parking lot, limiting the disabled from enjoying the waterfront views from the ADA fishing pier?	Section 3.15.2.3 of the Final EIS has been revised to address this comment.
0031-03	[Dowses Beach is the] site of an uncommon accessible fishing pier providing the disabled a closeup waterfront view of beautiful Nantucket Sound.	Section 3.15.2.3 of the Final EIS has been revised to address this comment.
0031-05	Many locals and visitors include recreational and commercial fishermen, boaters, beach goers and swimmers [Dowses Beach].	Thank you for your comment.
0034-02	This area has year-round recreational uses: handicap access for the disabled and elderly, family days at the beach, local summer youth programs, swimming lessons for youngsters, fishing, walking/running and people .. fresh air and beautiful scenery. In the winter months the parking lot and beach are used by many people to exercise... enjoy the peaceful views...	Section 3.15.2.3 of the Final EIS has been revised to address this comment.
0038-01	As a resident of Osterville and beach lover nothing brings me greater joy by witnessing people young and old using the handicap accessible fishing pier to fish or walk out on to the rocks.	Thank you for your comment.
0039-03	I am strongly opposed to the "Phase 2" onshore electrical cable landings at Dowses Beach...the handicap accessible fishing pier...for physically disabled community members to also enjoy our beautiful outdoors.	Section 3.15.2.3 of the Final EIS has been revised to address this comment.
0046-13	Dowes Beach is the only beach in Osterville that is reserved for the residents of Barnstable. It is also the only beach that has a boardwalk for the handicap to get to the water for a swim and it's the only beach that has a handicap fishing pier.	Section 3.15.2.3 of the Final EIS has been revised to address this comment.
0048-06	landing these cables in an environmentally fragile estuarine environment including a year-round handicapped accessible fishing pier, bathing beach, causeway (which frequently floods), two bays and parking lot where children swim, fish and play is not suitable. It will become a year-round industrial zone for life, given the necessary servicing of these high voltage lines via large manhole covers. The "Greater Dowses Beach" area that the Dowses family intended to be used as a "bathing beach" for the enjoyment of the residents will no longer be that. It will become an industrial site where the elderly, handicapped and children no longer feel safe.	Section 3.15.2.3 of the Final EIS has been revised to address this comment.

Comment Number	Comment	Response
0048-12	These locations have been proposed only in the economic interest of the developer, who is rushing to pad its own bottom line, and meet "deadlines" instead of doing things right...This will also be an economic disaster for our community, which relies on thousands of year-round tourists and visitors who have come to expect many days spent at Dowses Beach and in our downtown shops (where the developer has proposed bringing the cables underground), will have "construction zone" versus "welcome" signs for years. Tourists and seasonal visitors will go elsewhere, off Cape Cod, creating irreversible economic fallout.	Section 3.15.2.3 and Section G.2.7.2 of the Final EIS have been revised to address this comment.
0050-01	MV has had considerable unmanaged large estate building, which has resulted in overuse of energy for untold, typically vacant, multimillion dollar estates, wasting natural resources. Dowse's Beach area is a small inlet that was donated to the town after the mid-century hurricane. It cannot sustain this kind of upheaval and was never donated for this use.	Section 3.15.2.3 of the Final EIS has been revised to address this comment.
0057-02	The [Dowses Beach] parking lot is used all winter for its handicap accessibility to the pier and beach. There is no off season here. Access to the beach is down a narrow causeway that floods frequently.	Section 3.15.2.3 of the Final EIS has been revised to address this comment.
0060-01	Covell's Beach is a prime example of what will happened to Dowses if this project continues. The heavy trucks, construction crews, digging, fencing and total disregard for the future of Covell's is a ghastly window into what will happen to Dowses.	Section 3.15.2.3 of the Final EIS has been revised to address this comment.
0061-01	A number of folks against permitting the cable landing at Dowses Beach speak about the existing conditions there as if it were currently close to its natural state. It definitely is not.	Thank you for your comment.
0073-04	This beach is one of only 2 Open Spaces where the population of Osterville can recreate-not simply “in season” but year round. Many people prefer the Cape Fall thru Spring. There is a reason people live/relocate to the Cape and it is primarily to be in this area where nature & the sea is a prime source of enrichment, appreciation, and enjoyment of these natural “jewels”. This Public Dowses Beach is a resource that informs our sense of serenity-it is truly an exhilarating & calming source	Thank you for your comment.
0084-03	This location would be a major component feeding into the power grid. Keeping Commonwealth Wind serviced, operational, updated, etc., would likely take priority over any local public and recreational use, and perhaps even environmental protection considerations.	Section 3.15.2.3 of the Final EIS and Appendix G, Section G.2.7.1 have been revised to address this comment.
0086-05	[Dowses Beach is the] site of an uncommon accessible fishing pier providing the disabled a closeup waterfront view of beautiful Nantucket Sound. Many locals and visitors include recreational and commercial fishermen, boaters, beach goers and swimmers.	Section 3.15.2.3 of the Final EIS on has been revised to address this comment.

O.5.15 Scenic and Visual Resources

Table O.5-15: Responses to Comments on Scenic and Visual Resources

Comment Number	Comment	Response
0029-03	There are fewer and fewer beaches on Cape Cod that have retained their pristine and fragile natural beauty, but Dowses Beach is one of them. Dowses Beach is a natural treasure.	Section 3.16 of the Draft EIS addressed the visual impacts of the proposed Project.
0029-05	Seeing the large OSW ships on Nantucket Sound is not only an eyesore but a heartache for an ocean lover like myself. It is like someone decided to deface a beautiful painting.	Section 3.16 of the Draft EIS addressed the visual impacts of the proposed Project.
0034-07	There are so few pristine beautiful beaches left on Cape Cod. Dowses Beach is one of them...Avangrid, .. destroy this Cape Cod natural treasure simply to further its business interests	Section 3.16 of the Draft EIS addressed the visual impacts of the proposed Project.
0059-01	In reading the draft impact statement, we are concerned that the dark skies are not adequately addressed.	Section 3.16 of the Draft EIS addressed the nighttime visual conditions and potential impacts.
0086-06	Landing OSW cables on estuarine Dowses Beach and using the parking lot as a convenient staging area for Avangrid's multiyear industrial heavy machinery project would destroy the fragile natural beauty or Dowses Beach...There are so few pristine beautiful beaches left on Cape Cod.	Section 3.16 of the Draft EIS addressed the visual impacts of the proposed Project.

O.5.16 Air Quality

Table O.5-16: Responses to Comments on Air Quality

Comment Number	Comment	Response
0019-01	I believe strongly in efforts to tap into offshore wind resources in order to reduce air pollution. Reducing air pollution is not only key to reducing the effects of climate change, but is also key to reducing the very significant negative health impacts caused by people (and animals) inhaling pollutants from fossil fuels.	Thank you for your comment.
0025-03	Once completed the project will result in an annual reduction of more than four million tons of carbon dioxide equivalent (CO2e) emissions across New England, the equivalent of removing over 800,000 cars from the road each year.	Thank you for your comment.
0029-16	The air quality would be severely impacted. The ocean's winds would scatter the dug up dirt, worksite debris, exhaust fumes from fossil-fuel-powered vehicles. Instead of healthy walks and beach combing on Dowses Beach or paddle boarding, sailing, swimming, kayaking on East Bay and Nantucket Sound, the polluted air and worksite noises would drive away the citizens.	Section G.2.1.2 of the Draft EIS presented a detailed discussion on potential air quality impacts for the Project.
0029-21	Will the maintenance boats (running on fossil fuels) servicing the OSW turbines and structures be allowed to add to more carbon emissions or will there be battery operated vehicles mandated to service the OSW turbines and structures?	Section 2 of the Draft EIS provided a detailed discussion of the anticipated vessels and boats to be used for the Project. In addition, Section G.2.1 of the Draft EIS provided a discussion analysis of potential impacts from construction, operation and maintenance of the Project.
0049-04	Reports are coming in daily of serious health issues affecting humans as well esp those within a 2.5 mile radius—-neurological disorders. Seizures, anxiety, depression, heart issues etc. his process putting all we know n love at risk n taking g years to complete.	Section G.2.1, Table G.2.1-3 of the Draft EIS provided a summary of health benefits of offshore wind development.
0049-08	Also when the ocean floor is blown up —approx. 130 ft deep—it releases co2 stored in the sediment—-thus tipping the scale of out poor oceans having to reabsorb it when they're already absorbing the co2 from above. This leads to acidification n shellfish can no longer make their shells.	Thank you for your comment.
0067-02	The Network encourages BOEM to continue moving both phases of the New England Wind project forward with the recognition of the enormous environmental and economic benefits the project offers, especially compared to a "No Action" alternative. Net reductions in air pollutant emissions resulting from the Proposed Action are expected to contribute to long term benefits for communities by displacing emissions from fossil fuel generated power plants. Phase 1 and Phase 2 projects as proposed by Avangrid would result in annual avoided greenhouse gas emissions of 3.94 million US tons per year.	Thank you for your comment.

Comment Number	Comment	Response
0067-09	The air quality and other environmental benefits resulting from expanding renewable energy resources cannot wait.	Thank you for your comment.
0083-32	We urge BOEM to expand its analysis of offshore wind's beneficial climate impacts. The Draft EIS details many of the pressing impacts that climate change presents to communities, people, wildlife, and natural resources, as well as the benefits offshore wind brings from carbon and other pollutant emissions reductions. However, the Draft EIS does not account for the climate benefits of displacing full life-cycle emissions of gas generation, which includes the release of methane (which has a global warming potential 84 times that of CO2 on a 20-year time frame) emitted during the extraction and in the transmission and compression of gas. The Draft EIS also does not monetize these climate benefits using the social cost of carbon to illustrate differences between the social benefits of the Projects and the relative social cost of the alternatives. We recommend integrating the social and environmental costs of greenhouse gas emissions into the evaluation of project impacts and impacts of alternatives... The Interagency Working Group on Social Cost of Carbon has produced estimates for the social cost of carbon in order to "allow agencies to understand the social benefits of reducing [greenhouse gas] emissions, or the social costs of increasing such emissions, in the policy making process."... The social cost of carbon dioxide ranges from $14 to $260 (in 2020 dollars per metric ton of CO2) and could be used to monetize the costs imposed by the net greenhouse gas emissions associated with failing to achieve the offshore wind goals set by the Administration.	BOEM has added discussion on the development and results of the social cost of greenhouse gas emissions performed to quantitatively demonstrate the climate benefit of the project.
0086-14	The machinery used to conduct the 2/14/23 geotechnical borings on the fragile Dowses Causeway caused air pollution, noise pollution and water pollution. BOEM needs to fully address the real problems of pollution that would harm Dowses Beach and the people in the community. The ocean wind on Nantucket Sound can be a source of renewable energy but it can also kick up the dust from all the drilling and digging, etc. and pollute the environment.	Section G.2.1.2 of the Draft EIS presented a detailed discussion on potential air quality impacts for the Project.
0095-1-01	Without offshore wind projects such as New England Wind, we simply can't hope to significantly reduce our carbon emissions and mitigate our contribution to climate change. New England Wind alone will reduce carbon emissions by nearly 4 million tons, equivalent to taking more than 800,000 cars off the road annually...Offshore wind is the most important thing we can do in New England to reduce carbon emissions.	Thank you for your comment.

O.5.17 Water Quality

Table O.5-17: Responses to Comments on Water Quality

Comment Number	Comment	Response
0023-07	Cape Cod's sole source aquifer, specifically the so-named Sagamore Lens, underlies the immediate Dowses area. Hydrology studies of the mid-Cape confirm the shallowness of the aquifer in the immediate offshore area of Dowses beach. (Olcott, 1995) The aquifer occupies the Barnstable outwash plain on land and the subsurface glacial lake geologic zone beneath Nantucket Sound. As a result, there is little deviation in the depth of the water table in this part of Barnstable and the nearshore; it is estimated and generally recognized to be 50-80 feet below the surface. (Leblanc, 1986) The aquifer's critical freshwater and saltwater transition zone is located offshore, where the proponent is planning to dredge and penetrate the seabed. As the Town of Barnstable noted in its response to the ENF, the proposed HDD technology, both offshore and onshore, is therefore extremely risky to the aquifer and presents the risk of saltwater contamination to the region's drinking water.	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach.
0023-09	Should the proponent decide instead to pursue a plan to micro-tunnel under East Bay, as described in the COP, the issue of chemical pollution is considerable. The Centerville River estuary watershed has drained many decades of pollutants from indiscriminate human land use into the bay.	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach. Section 3.5 of the Draft EIS stated that impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach. The onshore export cable crossing of East Bay, if used, would use microtunneling, HDD, or other trenchless installation methods to pass beneath the bay and avoid impacts on coastal habitats.

Comment Number	Comment	Response
0029-04	Having seen the OSW industrialization of nearby Covell's Beach (its parking lot is filled with heavy noisy machinery spewing unknown fluids down the sandy beach) is to see how devastating the...project would be for a coastal community like Osterville,	Thank you for your comment.
0029-10	Most concerning of all is the proximity of the aquifer to the proposed cable landing site. Contamination of the aquifer, a true concern shared by the Barnstable town officials who are responsible for this unpopular OSW project, would devastate this coastal community. Contaminated drinking water would negatively impact the public health of the citizens, devalue home and real estate properties and seriously harm the economy of coastal Osterville. BOEM must consider these realities and major adverse impacts.	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach.
0031-07	The location for the Avangrid cable landing at Dowses Beach is too close to the aquifer, the source of our precious drinking water. Will our drinking water get contaminated by accidental releases of hazardous materials and become undrinkable? What will this mean for the public health of the residents?... BOEM cannot minimize the potential harm from hazardous materials that can spill on the shores of Dowses Beach and fatally contaminate our aquifer.	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach.
0034-03	As noted above, the location for the Avangrid cable landing at Dowses Beach is too close to the aquifer, the source of our precious drinking water. Will our drinking water get contaminated by accidental releases of hazardous materials and become undrinkable? What will this mean for the public health of the residents?... BOEM cannot minimize the potential	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore

Comment Number	Comment	Response
	harm from hazardous materials that can spill on the shores of Dowses Beach and fatally contaminate our aquifer.	areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach.
0037-01	[Dowses Beach landing site] Damaging our aquifer can never be corrected.	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach.
0043-02	These cables proposed have never been produced in the USA and therefore have no testing of their safety. These cables have a high risk of piercing our Cape aquifer that extends out beneath Dowes Beach. The cable routes will pass through our wells and end up sitting upon our underground aquifer. Avangrid will not disclose the temperature these cables will produce...irreparable harm to Cape Cod.	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach.

Comment Number	Comment	Response
0047-03	5. Danger to the aquifer	Thank you for your comment.
0048-10	Our sole aquifer is at stake with this potential project at Dowses Beach, both in the Dowses Beach area, and at the new substation locations.	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach.
0054-02	THE TOWN OF BARNSTABLE'S ATTORNEYS ARE ALSO CONCERNED ABOUT THE HUGE YET-TO-BE-BUILT SUBSTATIONS NEEDED TO RECEIVE THE HIGHEST AMOUNTS OF ELECTRIC POWER EVER TO COME TO OUR SHORES, NEVERMIND OUR TINY BEACH, DANGEROUSLY IMPACTING OUR SOLEAQUIFER FOR DRINKING WATER WTIH THEIR TOXIC CHEMICALS. THE AQUIFER ALSO EXTENDS DOWN TO EAST BAY, DOWSES BEACH, WHERE THE CENTERVILLE RIVER EMPTIES INTO THE BAYS.	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0068-03	*What about Osterville's very delicate waterway?*The potential of drilling through to the aquifer and destroying water sources for all of Cape Cod?	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline

Comment Number	Comment	Response
		erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach.
0086-10	The location for the Avangrid cable landing at Dowses Beach is too close to the aquifer, the source of our precious drinking water. Will our drinking water get contaminated by accidental releases of hazardous materials and become undrinkable? What will this mean for the public health of the residents? BOEM states that ·construction of future offshore wind activities would contribute to an increased risk for hazardous materials spills, the release of trash, and marine debris. BOEM also states that "Accidental releases may increase as a result of future• OSW activities, "primarily during construction." OSW construction certainly includes the cable landing planned for Dowses Beach and BOEM cannot Ignore this major life and death concern. Humans cannot live without drinking water. BOEM cannot minimize the potential harm from hazardous materials that can spill on the shores of Dowses Beach and fatally contaminate our aquifer. Contrary to BOEM it does not have a negligible impact.	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. As noted in the New England Wind COP Vol I Section 3.3.1.8, the engineering trajectory of the HDD shows the cable passing at a depth of approximately 9 m (30 ft) below the ground surface at Mean High Water. With the expected use of HDD at the landfall sites and the target burial depth of the offshore export cables, New England Wind is not expected to permanently alter nearshore hydrodynamics so as to affect shoreline erosion or accretion. Impacts on coastal habitats and fauna at the landfall site(s) would be avoided by locating the sea-to-shore transition vault in a paved area and, at the Dowses Beach Landfall Site, by using HDD to install the cable beneath the beach.
0086-11	[A spill] would mean the almost certain death of Osterville as a Cape Cod community as we now know it. It would render our real estate values, our homes nearly valueless. This means a loss of human habitat. That is a major adverse impact.	Section G.2.2 of the Draft EIS discusses the likelihood, volumes, and impacts of spills.

O.5.18 Bats

Table O.5-18: Responses to Comments on Bats

Comment Number	Comment	Response
0083-05	We recommend that BOEM... Require improved monitoring of... bat presence and collision rates by including radar, visual and thermal camera systems, and Motus and GPS tracking of both listed and non-listed species; commit to deploying collision detection technology, once commercially available.	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).
0083-29	New England Wind's proposal to deploy acoustic monitors post-construction on a subset of structures is an excellent first step. We recommend that New England Wind install bat detector stations at nacelle height (rather than on convertor stations, turbine platforms, and/or buoys) so as to detect activity when bats are in the rotor swept zone and more likely at risk for collision. New England Wind and BOEM should confer with bat researchers to determine how many acoustic detectors should be deployed and how many years of post-construction data collected in order to best inform impact analyses. BOEM should require that all acoustic data be reported and submitted to NABat and/or the Bat Acoustic Monitoring Portal, BatAMP.	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

Comment Number	Comment	Response
		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).
0083-30	We are excited to see New England Wind proposing to install and potentially upgrade Motus towers and support radio-tagging of ESA-listed birds. We recommend that New England Wind also support the tagging of bats, which are underrepresented in Motus, to support understanding of bat activity offshore. Additionally, we suggest that BOEM require deployment of Motus towers pre-construction in coordination with the U.S. Fish and Wildlife Service's offshore Motus network, as BOEM is requiring new lessees in the New York Bight, Carolina Long Bay, and California. We also urge New England Wind to keep Motus towers deployed, active, and maintained for as much of the lifetime of the Project as possible. Data from these towers will not only inform New England Wind's adaptive management but also, as multiple offshore wind projects are developed, provide a long-term network of Motus towers in the offshore environment that can shed much needed light on species' movements offshore.	Annual monitoring reports 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.
0083-31	New England Wind plans to report dead or injured bats found on vessels and project structures. We note that assessing bat fatalities based on carcasses found on vessels and structures is unlikely to provide a meaningful estimate of bat fatalities, as carcasses can fall far from the wind turbine, based on carcass size, wind speed, turbine height, and other factors. BOEM should consult with experts to determine what, if any, inferences about total fatalities can be made from carcasses detected on vessels and project structures. As new technologies become available for monitoring fatalities at offshore wind facilities, such as strike detection technology, BOEM should require New England Wind to commit to deploying these and, if monitoring reveals that impacts to bats are non-negligible, BOEM should require New England Wind to employ minimization strategies and deterrent technologies.	Annual monitoring reports 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.
0083-33	Once again, we underscore the need for adaptive monitoring. Because the proposed monitoring methods are unlikely to provide estimates of bat collisions from New England Wind's offshore operations but no collision detection technologies are validated and commercially available for use offshore, BOEM should require New England Wind to commit to deploying collision detection technology, once available. Strike detection	Annual monitoring reports 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.

Comment Number	Comment	Response
	technology is in development, with one technology to be tested on an offshore wind turbine in 2023. New England Wind should work with agency staff and researchers to determine the appropriate duration of post-construction fatality monitoring using their current proposed methods and for after collision detection systems are installed. The above recommendations should be included in the to-be-developed Avian and Bat Post- Construction Monitoring Plan and this plan should be made publicly available.	
0083-99	Little data exist on bats' use of the offshore environment and their interactions with offshore WTGs, although research at land-based wind facilities reveals that bat fatalities are common, with the potential for cumulative impacts to cause population-level declines. Because all bat species in Massachusetts have the potential to use the Project Area, have documented collisions with land-based wind energy facilities, and significant uncertainties exist around bats' use of the offshore environment, BOEM should not interpret a lack of data as a lack of impacts and instead work with New England Wind, the RWSC, and other developers to implement monitoring regimes to enable better understanding of bat impacts from offshore wind development.	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).
0083-100	Assessing cumulative effects is essential to understanding impacts and this is particularly important for bats, where the best available scientific information indicates that cumulative impacts from land-based wind energy have the potential to cause significant population-level declines. Based on a cursory and incomplete review of offshore bat data which omits recent data, New England Wind's Draft EIS states that the Proposed Action and other reasonably foreseeable projects will result in negligible cumulative impacts to bats... insufficient research is provided to support this claim. Of particular concern for the accuracy of BOEM's cumulative impact analysis for bats is the geographic analysis area. BOEM defines	Appendix E of the Draft EIS stated that 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]). This appendix discussed 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

Comment Number	Comment	Response
	the geographic analysis area as 100 mi offshore and 5 mi inland. This is at odds with the geographic analysis area used for bats for Vineyard Wind 1, where the area extended 100 mi inland. BOEM presents no research in the Draft EIS to support the assumption that bats found offshore exclusively use very near-coast habitat on land (i.e., five miles or less from the coasts) to support this limited geographic scope. A survey of available research on bat migration does not support BOEM's rationale for their limited inland geographic analysis area in New England Wind's Draft EIS. Although the migratory movements of bats, especially migratory tree bats, are poorly understood, many species of bats—both long-distance migrants like migratory tree bats but also cave bats—are capable of flights in excess of 100 km (62 mi), indicating that bats found offshore in wind development areas could also be found significant distances inland. Research from Canada found that 20 percent of little brown bat movements exceeded 500 km (311 mi), which is further supported by data from tracked little brown bats, which shows individuals using both coastal areas and making long-distance flights to locations significantly further inland than 0.5 mi. Hoary bats, which are capable of long distance flights over water, have been recorded traveling over 1,000 km (621 mi) and are thought capable of migrations in excess of 2,000 km (1243 mi). Furthermore, in addition to little brown bats, data in Motus tracks movements of individual silver-haired bats, eastern red bats, hoary bats, eastern small-footed bats, and Indiana bats between coastal areas on the east coast and areas in excess of 100 mi inland. These movements do not support a geographic analysis area that extends only five miles inland but rather suggest that bats exposed to offshore wind energy projects could be found far inland (and therefore exposed to land-based wind energy facilities) and that a geographic analysis area that extends 100 mi inland would be more appropriate. BOEM should conduct a thorough review of the literature on bat migration and radio- and GPS-tagged bats and select a boundary that better reflects the potential habitat use of exposed bats. This revised boundary will likely require an updated analysis to reflect that bats exposed to offshore wind projects could not only be exposed to multiple offshore wind facilities but also be exposed to land-based wind energy projects.	(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).
0083-101	"The Draft EIS and COP point to low bat detections (despite low survey effort) in the offshore environment to support a finding of negligible impacts on bats. The limited data analyzed were collected in the offshore environment in the absence of offshore wind turbine structures. These data are unlikely to reflect bats' use of the SWDA once turbines are constructed due to bats' attraction to wind turbines. Although the Draft EIS and COP note that structures attract bats and could increase the presence of bats in the SWDA, the analyses do not seem to account for	Bats may be attracted to the WTG's as potential roosts, potentially increased prey base, visual attraction, etc. Despite intensive efforts and research, there is no definitive answer as to why bats may be attracted to WTG's. It is possible bats may encounter these WTG's, 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

Comment Number	Comment	Response
	the potential increased collision risk associated with attraction. Instead, the Draft EIS states that ""relatively little bat activity has been documented in open water habitat similar to the conditions in the SWDA[,]"" without acknowledging that the Proposed Action would significantly change the habitat by adding up to 135 new structures (130 WTGs and five electrical service platforms). Given the addition of structures post-construction and bats' known attraction to structures, including wind turbines, basing post-construction impact analyses on pre-construction data or other data collected in the absence of turbines is inappropriate. At land-based wind facilities, pre-construction bat activity does not correlate with post-construction fatalities, likely due to bats' attraction to turbine structures. Furthermore, recent research at buoys, vessels, and the two CVOW pilot project wind turbines off the Virginia coast found considerable differences in bat activity in the presence of turbines as compared to open water. This once again underscores that BOEM should not draw conclusions about New England Wind's impacts on bats based on sparse offshore acoustic data collected over open water.	carcasses are rarely found at the base of onshore turbine towers (Choi et al. 2020).
0083-102	Although the COP and Draft EIS acknowledge bats' attractions to wind turbines, this attraction is not clearly factored into the impact analyses as to how it could increase collision risk. In fact, the COP and Draft EIS explicitly state that the wide spacing of the turbines in the offshore environment would allow bats "to avoid operating WTGs" and thereby minimize risk of potential collisions. This assertion is starkly at odds with the best available scientific information on bats and wind turbines which indicates that bats will change course not to avoid, but to approach wind turbines. BOEM must consider the potential that bats could be attracted to offshore wind turbines—which would dramatically increase collision risk—and update the impact assessment accordingly.	Bats may be attracted to the WTG's as potential roosts, potentially increased prey base, visual attraction, etc. Despite intensive efforts and research, there is no definitive answer as to why bats may be attracted to WTG's. It is possible bats may encounter these WTG's, 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).
0083-103	A lack of data on offshore movements of cave-hibernating bats, such as Myotis bats, including the newly endangered northern long-eared bat, does not imply a lack of impacts. Despite acknowledging that there is uncertainty around movements and behaviors of bats offshore, the COP and Draft EIS nevertheless conclude that impacts to cave-hibernating bats, including the now-endangered northern long-eared bat, are "expected to be insignificant to unlikely " as "no measurable impacts are expected due to the expected absence of bats within the SWDA." However, cave-hibernating bats may be found offshore more frequently and at greater distance than the assessments in the COP and Draft EIS indicate. Although the Draft EIS cites a study finding "very little offshore activity of Myotis species in the mid- Atlantic[,]" that same study actually identified Myotis calls at 63 percent of sites surveyed in the Mid-	The likelihood of detecting a cave bat is substantially less than tree bats 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

Comment Number	Comment	Response
	Atlantic, and Myotis species were present at 89 percent of sites surveyed across the Gulf of Maine, Mid- Atlantic, and Great Lakes.	
0083-104	BOEM Should Include Indiana Bats in Impact Analyses. Although the Draft EIS and COP both state that the federally endangered Indiana bat is not known to occur in eastern Massachusetts, a tagged Indiana bat was detected just north of the SWDA, as discussed in Section III.H.3 of our scoping comments. We refer BOEM back to those scoping comments.	Appendix A of the Final EIS includes a discussion of the consultations for the proposed Project which includes consulting with the USFWS to determine those species with the potential to be effected by the proposed project and included in the Project-specific Biological Assessment for listed species. Section G.2.3 of the EIS includes a summary of the Biological Assessment and consultation results with USFWS will be included in the ROD.
0083-105	Although endangered northern long-eared bats could be present near onshore components of New England Wind, on Block Island, on Long Island, and on Martha's Vineyard, collision impacts are wholly dismissed, with the COP stating that "exposure of northern long-eared bats [to the SWDA] is expected to be insignificant and will not be discussed further." This conclusion relies on a lack of acoustic detections offshore coupled with a small study in which five tracked northern long-eared bats did not make offshore movements. While limited offshore movement data exist for bats, the presence of northern long-eared bats on both Martha's Vineyard and Nantucket indicates that this species can cross open water and the species has been tracked making long distance flights over water in the Gulf of Maine. Even though the COP and Draft EIS repeatedly express that northern long-eared bats would not be found offshore, the Biological Assessment notes that northern long-eared bats have been detected offshore, although this data is not included in the COP or Draft EIS. In fact, a northern long-eared bat was acoustically detected northeast of the SWDA, 34 km offshore within the South Fork Wind Farm Project Area. Furthermore, the lack of confirmed acoustic calls from northern long-eared bats in some offshore wind surveys does not necessarily support the conclusion that northern long-eared bats would not be found in the SWDA, as acoustic surveys often detect high frequency calls that could not be identified to species but could have been produced by northern long-eared bats. Given the potential for the species to use the offshore environment, the detection of a northern long- eared bat during South Fork Wind Farm surveys, and the lack of survey efforts to provide evidence of absence, BOEM should not consider exposure and risk to northern long-eared bats and other cave bats to be negligible. Instead, BOEM should consult with the U.S. Fish and Wildlife Service on potential collision impacts in the SWDA and require New England Wind to conduct or support monitoring to better understand the potential presence of and collision risk to northern long-eared bats in the SWDA.	The likelihood of detecting a cave bat is substantially less than tree bats 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.

Comment Number	Comment	Response
0083-106	Because of the significant data gaps that preclude meaningful impact analyses for bats and offshore wind development, robust monitoring, especially post-construction monitoring, will be critical to better understanding potential impacts to bats from New England Wind's operations. We applaud BOEM for noting the need for adaptive monitoring and management for bats and are encouraged to see that New England Wind would allow "for the flexibility to include new technology... We recommend that BOEM strengthen this to a requirement that, as new technologies become available for monitoring impacts at offshore wind facilities (e.g., offshore turbine strike detection technology), New England Wind must commit to deploying these technologies. We strongly support BOEM's note that, if monitoring reveals that impacts to bats are non-negligible, New England Wind must develop new mitigation measures.	Section G.2.3.2 of the Final EIS has been revised to address this comment.
0083-107	To inform the forthcoming Avian and Bat Monitoring Plan, we provide the following monitoring and adaptive management recommendations. 1. Post-construction Monitoring. Because... pre-construction acoustic activity may not accurately predict post-construction fatalities for bats, a commitment to post-construction monitoring is critical to yielding a better understanding about how bats interact with offshore wind turbines. We appreciate that BOEM will require the data from bat surveys to be made accessible to agencies and that New England Wind must work with BOEM to ensure data are publicly available, and we encourage such data sharing to be promptly required... for all post-construction monitoring data.	Section G.2.3.2 of the Final EIS has been revised to address this comment.
0083-108	We strongly support BOEM's proposed measure that New England Wind recommend new mitigation measures or monitoring measures "[i]f the reported monitoring results deviate substantially from the impact analysis included in the Final EIS[.]" However, there is a lack of clarity as to what would trigger this adaptive management. The post-construction monitoring for bats that New England Wind has proposed - acoustic monitoring, carcass reports from vessels and structures, and post-construction boat surveys - are unlikely to provide comprehensive information on bat collisions, which are the greatest source of impacts to bats from the offshore components of offshore wind development. No research or methods are presented to translate monitoring data from these sources into bat impacts nor are we aware of any methods accepted by subject matter experts to do so.	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

Comment Number	Comment	Response
		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).
0083-124	We recommend that BOEM... Specify how impacts to bat.... species will be determined from monitoring data, as well as what will trigger adaptive management.	Annual monitoring reports 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.
0083-125	We recommend that BOEM... Consult with the U.S. Fish and Wildlife Service about potential offshore collision impacts to the northern long-eared bat, which was recently reclassified as endangered.	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).

O.5.19 Birds

Table O.5-19: Responses to Comments on Birds

Comment Number	Comment	Response
0023-06	The installation of three conduits for the onshore export cables will occur under the beach from one end to the other, causing vibration, displacement, and noise, all of which are anathema to shorebirds.	Section G.2.4 of the Final EIS has been updated to address this comment.
0038-02	Where will the Piping plovers have their nests if this happens?	Section G.2.4 of the Draft EIS addressed piping plovers.
0046-04	What of the multiple nests in the whole area of the endangered piping plover and the magnificent Ospreys. They and other species will be harmed not only by the wind turbines themselves but for certain by the years of heavy equipment and construction.	Section G.2.4 of the Draft EIS addressed piping plovers.
0048-09	The federally protected least terns, piping plovers, osprey and other migratory birds and wildlife make Dowses Beach their home year-round.	Section G.2.4 of the Draft EIS addressed the potential impacts to birds.
0083-03	Support from the offshore wind industry for... [bird] conservation measures could help mitigate impacts from the development of offshore wind. Mitigation restoration actions that are taken should prioritize species of greatest conservation need. Such prio	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).

Comment Number	Comment	Response
0083-04	We recommend that BOEM... Require improved monitoring of bird.... presence and collision rates by including radar, visual and thermal camera systems, and Motus and GPS tracking of both listed and non-listed species; commit to deploying collision detection technology, once commercially available.	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).
0083-20	While there is uncertainty regarding the impacts of these offshore wind facilities on the shore-nesting Roseate Tern, Piping Plover and other coastal waterbirds, habitat management and stewardship measures to enhance breeding success are well understood but still underfunded. We recommend that the project consider supporting conservation projects to maintain and improve productivity of these birds.	BOEM and the USFWS established a Memorandum of Understanding (MOU) on June 4, 2009 to strengthen migratory bird conservation through enhanced collaboration between the agencies. This MOU identifies specific areas in which cooperation between the agencies would substantially contribute to the conservation and management of migratory birds including the Piping Plover, Roseate Tern, and their habitats.
0083-22	Noise monitoring and abatement during impulsive pile driving operations for monopile installation has been an established practice in other Atlantic wind energy project areas. Distances to the injury-causing sound levels measured in one study varied from 0.7 to 3.1 km for the marine mammals during the installation activities. Consequently, adequate spatial buffers or suitable observation distances may be necessary for any study designs that are used to monitor avian reactions to subsurface acoustic disturbance.	Section G.2.4 of the Draft EIS addressed the potential impacts to birds.
0083-23	We recommend the following changes to the New England Wind monitoring framework for birds:... Prioritize GPS tracking rather than Motus tracking wherever possible. Currently, satellite- uploading GPS transmitters weighing 4 g are commercially available, meaning that any individual bird or bat weighing ?133 g could be tracked using GPS	BOEM requires the applicant to coordinate with BOEM and the USFWS to finalize a bird monitoring plan prior to the start of construction. Acoustic monitoring devices will be utilized to estimate the exposure of ESA species and other migratory birds to the wind facility. Periodic monitoring progress reports as well as annual reports will be submitted and reviewed by BOEM

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	without exceeding the accepted 3 percent body mass threshold for ideal transmitter weight. This number will likely decrease over time, as transmitters weighing 1 g (suitable for a 33 g animal) are currently in development.	and the USFWS. The review would include the potential need for revisions to the monitoring plan.
0083-24	We recommend the following changes to the New England Wind monitoring framework for birds:... Consider adding focal, non-ESA listed bird species for a tracking study across multiple wind area projects to detect whether and how avoidance, attraction, collision risk, and/or displacement may occur around New England Wind and adjoining lease areas. Selection of such a species can rely on the results of either project site surveys in aggregate or the MDAT data, preferably both, that identify those species that are most widespread across multiple offshore wind farms. A cross-project tracking study could also build on previous studies that have identified the most susceptible species of marine birds.	BOEM has reviewed collision risks with established offshore wind farms off the coast of Denmark and England. Without the collision detection technology to provide location specific data, similar outcomes are expected for the NE Wind project.
0083-25	We recommend the following changes to the New England Wind monitoring framework for birds:... Minimize acoustic disturbance from construction and operations on diving marine birds. One means to accomplish this objective is to co-place seabird observers with marine mammal observers (PSOs) during acoustic disturbance activities and monitoring periods. However, underwater acoustic disturbance to diving marine birds would be obviated if pile-driving and other noisy activities are scheduled largely outside the winter and early spring months (November-April) when few or no such diving species would be present in the wind farm area.	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).
0083-26	We recommend the following changes to the New England Wind monitoring framework for birds:... Expand monitoring of avian displacement to include detecting avoidance at individual wind turbines across relevant spatial scales. Meso- and macro-scale displacement can	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

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	be studied with high-definition digital aerial surveys using established protocols and accepted survey designs. Micro-scale displacement should be studied with automated, remote instrumentation that quantifies continuous bird flux at risk height, but also, where feasible, detect and record the approach distances, directional changes, and collision impacts of individual birds and bats.	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).
0083-27	We recommend the following changes to the New England Wind monitoring framework for birds:... Include a reasonable requirement for timely reporting of all data (e.g., all data collected during monitoring efforts must be made available within a year after collection, much as bird and bat mortality must be reported). Although New England Wind states it will work with BOEM to ensure data is publicly available, no time limit is given for this availability. Rapid dissemination of monitoring data will ensure that it reaches the public domain and can be accessed by researchers working on affected species throughout their ranges, thereby enabling rapid integration of findings across multiple offshore wind energy projects to gauge cumulative effects more fully.	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).

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0083-28	We recommend the following changes to the New England Wind monitoring framework for birds:... Describe acceptable levels of impact and specify mitigation to be taken. The Mitigation and Monitoring plan anticipates merely documenting any dead or injured birds that happen to be found on vessels and structures during construction, operations, and decommissioning. Effective monitoring and mitigation activity should also include describing justifying: (a) how carcass observations or other collision and displacement monitoring results can be extrapolated to achieve realistic estimates of the mortality within a population-level context, (b) what thresholds (demographic, mortality, etc.) are to be used to initiate the mitigation activities, (c) what mitigation activities for restoration will be considered to offset the observed impacts, including why those restoration actions are appropriate for the particular taxa involved, and (d) what measures of success are to be used to confirm that restoration management strategies have been successful.	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).
0083-82	Avian risks from offshore wind energy development can be curtailed first and foremost by avoiding the greatest concentrations of marine birds occurring on the OCS. Optimal siting relies on some measure of severity in spatial conflict between bird protection and social goals such as efficient generation of offshore wind power. New England Wind lies outside the primary use areas of most coastally breeding bird species, yet also far enough away from elevated marine bird concentrations at and beyond the continental shelf edge. The offshore distances for the project (>30 km) thereby allows the Project to avoid offshore habitats with the highest aggregate abundance of marine birds, appropriately following the mitigation hierarchy. At the outset, New England Wind implements a strategy of avoidance within the mitigation hierarchy to reduce the avian risks within a larger regional context. By dodging those offshore habitats with the highest aggregate abundance of marine birds, the Project is instead located in less productive marine habitats over the middle continental shelf where bird abundance is generally lower.	Section G.2.4 of the Draft EIS addressed the potential impacts to birds.
0083-83	The New England Wind Draft EIS and COP for offshore marine birds rely on three primary data sources: (1) the New England Wind boat-	Section G.2.4 of the Draft EIS addressed the potential impacts to birds.

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	based surveys, (2) Mascen aerial surveys, which cover the Massachusetts WEA, and (3) the Marine-life Data and Analysis Team (MDAT) marine bird relative density and distribution model. In combination these reveal that the SWDA hosts a diverse assemblage of diving marine birds that are present seasonally, including cormorants, sea ducks, acids, and loons, some or all of which occur primarily during fall, winter, or spring... We agree that the Black-capped Petrel is not likely to occur in or near New England Wind, however, as this species typically inhabits deep pelagic waters beyond the continental shelf edge.	
0083-84	Red Knot, Piping Plover, and Roseate Tern all migrate broadly through offshore waters of the Mid- Atlantic Bight at or very near New England Wind as well as adjacent wind energy project sites in this region. Past tracking studies clearly indicate that at least some individuals of these species can pass through Rhode Island and Massachusetts WEAs. Consequently, the post-construction monitoring programs for all three of these listed species should remain effectually robust to detect any impacts from offshore wind projects. We are pleased to see that up to 150 Motus tags per year for up to 3 years would be deployed to track Roseate Terns, Common Terns, and/or nocturnal passerine migrants. Although the post-construction monitoring program also anticipates installing Motus receivers on turbines in the SWDA, including upgrades or maintenance of two onshore Motus receivers, the total number and location(s) of the offshore receiver stations is not specified. We recommend optimizing the number and/or the dispersion of stations ultimately selected using a design tool being developed under a New York State Energy Research and Development Authority (NYSERDA) project.	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).
0083-85	Most of the New England population of Piping Plovers nests in Massachusetts. After consultation with the Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program (NHESP), a draft Piping Plover Protection Plan (PPPP) was prepared specifically to avoid noise-related impacts to nesting Piping Plovers from horizontal directional drilling (HDD) activities associated with the New England Wind 1 Connector at the Covell's Beach Landfall Site in Barnstable, Massachusetts. Certain measures are to be taken to protect this state-listed species and its habitats during the	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.

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	nesting season (April 1 - August 31), including but not limited to work stoppages, and a contingency plan implemented should any problems arise during HDD cable installation. We strongly endorse plan monitoring by qualified biologists from an accredited organization or an individual who has at least one year of previous experience at an accredited organization conducting shorebird monitoring for Piping Plovers.	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).
0083-86	Birds other than imperiled species are also potentially vulnerable to offshore wind or have equally uncertain population trends in relation to expanding footprints of wind energy infrastructure in the region around New England Wind. Moreover, larger-bodied species of birds can make better study subjects for understanding migratory connectivity and for determining optimal locations to monitor and mitigate populations subject to offshore wind farms. We note that no other birds, including any pelagic marine species, are the explicit subject in the SWDA monitoring framework. This oversight in monitoring coverage for non-ESA listed (but still vulnerable) focal bird species around wind energy infrastructure needs better justification. For example, recent tracking studies of White-winged Scoters in southern New England have revealed frequent commuting flights between Nantucket Sound and Long Island Sound, and medium-high relative use of offshore habitats in the SWDA.	Section G.2.4 of the Draft EIS addressed the potential impacts to birds.
0083-87	When studied, underwater hearing abilities for diving bird taxa are discovered as more sensitive than expected, with hearing thresholds in the frequency band 1–4 kHz comparable to those measured in seals and toothed whales. Diving marine birds foraging The monitoring framework for New England Wind does not address how acoustic disturbances from construction and related operations might cause harm to diving marine birds. We refer specifically to lethal or sublethal injury from sound pressure waves caused by high intensity acoustic pulses, not to avoidance or temporary displacements that can arise solely from avian changes in behavior. Because seabird taxa sensitive to this impact are more prevalent during winter, minimization activities like curtailment may be justified to abate harm. Capable of diving to 180 m depths, Razorbills are already known to flush readily	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

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	from loud noises, they are prevalent during winter in waters of the New England Wind, and like other acids they are vulnerable to displacement and macro-avoidance. Densities of diving birds are typically highest in winter months on inner and middle shelf habitats, at least in this portion of the Atlantic OCS. Therefore, shifting the construction season for pile-driving and other noisy operations may eliminate altogether any underwater acoustic disturbance to diving birds. If time/area closures are not practical, other methods for sound abatement may include: (1) establishing safety zones monitored by visual observers or passive acoustics, and that trigger shut-down or low- power operations if large diving bird flocks enter these zones, (2) using noise reduction gear like bubble curtains around pile driving when diving birds are present, and (3) deploying other noise-source modifications, such as soft starts (currently included in the Draft EIS).	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)."
0083-88	We also suggest more transparent discussion of areas where minimal risk is assumed based on limited information or high uncertainty. This includes effects of low frequency sound (infrasound) during turbine operations, potentially interfering with avian navigation. While there is limited information available to test or contextualize infrasound impacts on birds, more monitoring is needed. Similarly, the indirect effects to marine birds from redistribution of forage fish populations after construction are also not discussed. Installation of turbines at New England Wind will likely affect forage fish populations by removing existing hard and soft bottom substrates and replacing them with vertical structures that act as artificial reefs. Given high uncertainty in the synergistic effects of these alterations on fish and secondary consequences for avian habitat use and energetics, the potential for such effects should be acknowledged and incorporated into adaptive monitoring frameworks.	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).
0083-89	New England Wind intends to reduce illumination to lessen the potential impacts of nighttime light on migratory birds. To reduce long-term phototactic attraction, New England Wind proposes to use minimal lighting intensity on vessels, wind turbine generators, and	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

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	electric service platforms to permit safe construction, operations, and decommissioning activities while still reducing potential attraction of birds. In addition, and conditional on USCG approval, the top of each light will be shielded to prevent upward illumination to minimize potential of attracting migratory birds. An Aircraft Detection Lighting System (ADLS) efficacy analysis indicates that an ADLS-controlled obstruction lighting system could result in over a 99% reduction in system activated duration as compared to a traditional always-on obstruction lighting system. Although reduced lighting practices might reduce potential impacts to avian species, no provisions for studying avian response(s) to lights has been made in the monitoring framework.	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).
0083-90	We stress that phototaxis (i.e., the disoriented attraction of birds drawn from some distance to lights on turbine towers), creates conditions in which the bird numbers attracted will scale as the square of the range from which they are drawn, thereby greatly increasing potential for adverse impacts (i.e., higher collision risk). More research and monitoring is needed to measure distances at which phototaxis operates in seabirds (especially the susceptible procellariiforms). In the context of collision with turbine blades, the probability of collision is inflated by flux density as the disoriented birds pass repeatedly through rotor swept areas. Neither the avian risk assessment nor avian monitoring framework proposed suitably address the potential of high flux density caused by turbine-associated phototaxis.	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).

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0083-91	Neither the avian risk assessment nor avian monitoring framework proposed suitably address the potential of high flux density caused by turbine-associated phototaxis. Previous research indicates that spatial responses of marine birds to offshore wind infrastructure can consist of (1) displacement around, (2) attraction to, (3) or neutral association with the overall project footprint. One large literature review of North American and European bird reactions to wind farms indicates that displacement in offshore habitats is 2-3 times more prevalent than attraction. Across 71 peer-reviewed studies, avian displacement distances from turbines (mean ± standard deviation) ranged from 116 ± 64 m in Anseriformes (ducks), 2,517 ± 5,560 m in Charadriiformes (gulls, terns, shorebirds), and 12,062 ± 6911 m in Gaviiformes (loons).	Section G.2.4 of the Draft EIS addressed the potential impacts to birds.
0083-92	For post-construction monitoring, New England Wind apparently intends to rely solely on pre- and post- construction boat surveys, supplemented by avian behavior point count surveys at individual WTGs. Although this methodology might furnish some information about bird displacement and collision vulnerability, no descriptions or citations are given for the study design(s) that would be applied to evaluate how avian displacement is manifest at New England Wind and neighboring wind farms. To detect differences in avian distribution pre- and post-construction, surveys must be designed and implemented to account for detection bias, to adequately cover the lease area and its surroundings, and to collect data at the necessary resolution. The Mitigation and Monitoring plan makes no mention of how to detect or estimate micro-avoidance, i.e., the behavioral ability of birds and bats to make last minute adjustments at small scales to avoid collision with rotors and other turbine structures.	Section G.2.4 of the Draft EIS addressed the potential impacts to birds.
0083-97	We recommend the following changes to the New England Wind monitoring framework for birds: 1. Add visual camera and thermal/infrared camera systems at substations and selected turbines. This will improve detection and identification of nocturnal migrants and help better estimate collision rates and avoidance behaviors. Incorporating multiple sensor types, or using available integrated monitoring systems that combine acoustic detection with visual camera technologies, thermographic imaging, and very high frequency (VHF) detection, would be a much more appropriate system to collect the information being sought.	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

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0083-98	Support from the offshore wind industry for... [bird] conservation measures could help mitigate impacts from the development of offshore wind. Mitigation restoration actions that are taken should prioritize species of greatest conservation need. Such priorities may include ESA-listed species like Roseate Tern, or species predicted to have the highest likelihood of cumulative impacts due to the extensive footprint of offshore wind development that is projected in the future along the U.S. East Coast. To better address the little-studied IPFs, such as underwater acoustic disturbance, widespread occurrence of the deep-diving Razorbill both within New England Wind and across SWDA, the species' joint vulnerabilities to displacement, macro-avoidance, and noise disturbance, plus a body mass suitable for satellite tagging, all make this acid a convenient and informative species for monitoring purposes. Similarly, avian species identified as having high exposure scores across the entire year, high displacement or population vulnerability, and/or greater collision vulnerability via their behaviors all would make prime candidates for New England Wind's monitoring and/or mitigation activities. Other programs that may provide example frameworks for an offshore wind wildlife mitigation program may include in-lieu fee wetlands mitigation programs under the federal Clean Water Act, the Natural Resource Damage Assessment and Restoration Program, the Renewable Wind Energy Research Fund, state endangered species mitigation programs such as the Massachusetts Endangered Species Act (MESA) Conservation and Management Plan permitting process, or the Vermont Act 250 Section 248 Certificate of Public Good process.	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).
0083-123	We recommend that BOEM... Specify how impacts to.... bird species will be determined from monitoring data, as well as what will trigger adaptive management.	BOEM requires the applicant to coordinate with BOEM and the USFWS to finalize a bird monitoring plan prior to the start of construction. Acoustic monitoring devices will be utilized to estimate the exposure of ESA species and other migratory birds to the wind facility. Periodic monitoring progress reports as well as annual reports will be submitted and reviewed by BOEM and the USFWS. The review would include the potential need for revisions to the monitoring plan.

O.5.20 Wetlands and Waters of the United States

Table O.5-20: Responses to Comments on Wetlands and Waters of the United States

Comment Number	Comment	Response
0028-03	According to the Draft EIS, both the preferred and alternative onshore transmission cable routes for both phases on Cape Cod are located entirely within public roadway layouts or within the beach parking lots. However, APCC noted in our written comments on the project's Environmental Notification Form submitted to the Massachusetts Environmental Policy Act (MEPA) Office that it appears that the Phase 2 Commonwealth Wind project's cables cross several wetland areas along the onshore transmission route. Additional information should be provided to ensure that none of these wetland resource areas will be adversely impacted.	Section 2.6.2 of the Final EIS has been revised to address this comment.

O.5.21 Land Use and Coastal Infrastructure

Table O.5-21: Responses to Comments on Land Use and Coastal Infrastructure

Comment Number	Comment	Response
0023-08	Should the proponent decide to proceed with the trenching of the causeway (as proposed in the ENF and less prominently in the COP), the fragile nature of this structure is a major consideration. The Town of Barnstable has indicated the possible failure of the causeway's box culvert given the proponent's plans, outlined in the ENF, to "hang" a portion of the heavy conduit duct bank from the structure in a 1x12 configuration. The culvert, never intended to support utility infrastructure, allows the exchange of water between the bays, thus ensuring a healthy embayment and habitat. Should the culvert fail, the causeway itself, as well as the two bays, would suffer catastrophic structural and environmental damage.	The COP in Section 4.2.2.1 notes that the onshore export cable route from the Dowses Beach Landfall site could be either along the road right-of-way (which would require it to cross the causeway connecting the Dowses Beach access road to East Bay Road) or via a trenchless crossing of East Bay. Section G.2.7.2 of the Final EIS has been updated to note the concerns expressed in the Town of Barnstable's letter to the Massachusetts Office or Energy and Environmental Affairs regarding the use of the causeway for the onshore cable route.
0029-19	Light pollution impacting citizens will also be a factor threatening public health. Especially those near the Dowses Beach construction site and the 8 Shootflying Hill road substation site. Sleep deprivation is unhealthy and is a public health issue.	Section G.2.7.2 and Appendix H of the Final EIS have been revised to address this comment. 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.
0031-08	There is a Causeway separating East Bay and Phinney's Bay. BOEM vaguely describes a "paved area" but is this actually the Causeway? There are so few pristine beautiful beaches left on Cape Cod. Dowses Beach is one of them.	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)."

Comment Number	Comment	Response
0031-09	Contrary to BOEM [a spill] does not have a negligible impact. That would mean the almost certain death of Osterville as a Cape Cod community as we now know it. It would render our real estate values, our homes nearly valueless. This means a loss of human habitat. That is a major adverse impact.	Section G.2.7.2 of the Final EIS has been revised to clarify that the Dowses Beach parking area would potentially be used for the landfall site.
0046-07	Osterville is the last needed location of the sewer project as home lots are large here and many homes are used in the summer only. Waste water is handled with ease.	Thank you for your comment.
0073-05	As our experience with any utility company has shown us over time, this will be the area where the maintenance trucks/cranes/offshore barges will be coming to excavate, tweak, and repair at will. Will Avangrid want to add more cables to Dowses?? Once a utility is given license to public land, they "own it".	Section 3.15.2.3 and Section G.2.7.1 of the Final EIS have been revised to address this comment.
0086-01	One of the most important reasons that I purchased my house in Otterville was it's proximity to Dawes Beach.	Thank you for your comment.

O.5.22 Appendix A, Required Environmental Permits and Consultations

Table O.5-22: Responses to Comments on Appendix A, Required Environmental Permits and Consultations

Comment Number	Comment	Response
0029-22	Block Island Wind Farm in Rhode Island demonstrates the high upfront costs of OSW ($320 million) and its unreliability (only 1 turbine is reportedly working out of a total of 5 turbines.) This was an OSW project by Orsted. Will Avangrid, an inexperienced newbie in the OSW industry, be able to succeed where more experienced Orsted has failed? CW is a much bigger project than Block Island. Yet it is Avangrid’s project. N.B. Avangrid’s parent Iberdrola is now looking to leave the OSW business in the USA. Avangrid has publicly reported that it cannot afford CW as the original contract was negotiated.	Thank you for your comment.
0033-02	We also understand that Avangrid bears little risk should anything go wrong and that is we, the residents of Barnstable, who bear the risk.	Thank you for your comment.
0037-02	[Dowses Beach landing site] The risk if underground fires...who will put them out?...This is a limited liability corporation that is only protecting ITSELF from any future responsibility.	Thank you for your comment.
0046-08	The disruption to the Covell beach and the entire Hyannis area by the Vineyard Wind Project is a living example of the disruption and destruction these projects create. They never stay on schedule and never restore the sites areas to their original habitat.	Thank you for your comment.
0046-09	Avangrid claims they can only tap into the power grid on the Cape. This seems ridiculous. I also question how this may impact the ability to use the power lines on the Cape for future electrical needs for down Cape homes and business. Has this been answered?	Thank you for your comment.
0051-02	Avangrid Renewables has structured this project as a separately owned subsidiary, markedly limiting its liability should any unanticipated ill effects occur. In addition, revenues from the project supporting the Town of Barnstable are calculated to be minimal in comparison to the town's budget over the lifetime of the project.	Thank you for your comment.
0074-05	There was an early effort in 1980 to nominate “all of Nantucket Sound as a national marine sanctuary” with a joint federal-state management plan. Massachusetts state agencies “documented the region’s ecological significance and its importance to such economic uses as fishing and tourism.”...This nomination historically underscores what a natural treasure Nantucket Sound is and how it needs to be protected by BOEM rather than be industrialized by OSW.	Thank you for your comment.

Comment Number	Comment	Response
0076-09	BOEM cannot make its review dependent on speculative power purchase agreements signed prior to COP review with state utilities and state renewable energy goals as a limiting factor affecting its NEPA and OSCLA review requirements. BOEM habitually excludes Alternatives from review because it would not allow developers to meet these "contractual" agreements, which only serves to make BOEM a party to a speculative contract. BOEM is even now restricting its analysis based on ongoing contractual negotiations between developers and states, essentially making BOEM an active party to ongoing contracts and agreements. This must be disallowed and any previous approvals based on such reasoning overturned.	Thank you for your comment.
0076-10	Rather than comply with its OSCLA duties which state that the Secretary "shall ensure", among other things, "prevention of interference with reasonable uses" such as commercial fishing when conducting all manner of offshore wind leasing, BOEM has instead substituted "promoting ocean co-use" as its own requirement. "Promoting ocean co-use" is not the same as "shall ensure prevention of interference with reasonable uses." BOEM attributes the "goals of the federal agencies to deploy 30 gigawatts [GW] of offshore wind energy capacity in the United States by 2030 while...promoting ocean co use" in place of the actual legal OSCLA requirements to a White House Executive Order. An Executive Order cannot overrule Congressional legislation. As such, BOEM's assumptions in the Purpose and Need section of the Draft EIS is faulty at its core, and therefore all resulting analysis is faulty.	Thank you for your comment.
0076-11	BOEM states that it will make its determination on the proposed Project "after weighing the factors in subsection 8(p)(4) of OSCLA that are applicable to plan decisions and in consideration of the above goals". OSCLA says nothing about weighing. It says "shall ensure" the factors listed, not in consideration of the developers or state's goals or contractual "obligations", but in the absolute. BOEM has the authority to lease for offshore wind, subject to constraints. These legal constraints override Executive Order policy statements, developer contract "obligations" and full buildout goals, and state energy goals.	This purpose reflects BOEM's authority under the Outer Continental Shelf Lands Act (OCSLA) to authorize renewable energy activities on the OCS, as well as EO 14008; the shared goals of the Departments of Interior (DOI), Energy (DOE), and Commerce (DOC) to deploy 30 gigawatts (GW) of offshore wind energy capacity in the United States by 2030 while protecting biodiversity and promoting ocean co-use (White House 2021); and consideration of the goals of the applicant. BOEM will make this determination after weighing the factors in Subsection 8(p)(4) of the OCSLA that are applicable to plan decisions and considering the above goals.

Comment Number	Comment	Response
0083-77	Appendix H of the Draft EIS mentions that the Applicant will employ noise attenuation mitigation during all pile driving activities. However, the use of noise attenuation is not anticipated for other noise producing activities. It is important for BOEM to acknowledge that noise generated by these activities (i.e., vibratory pile driving, cofferdam installation, etc.) may disturb marine life, and for the agency to i) monitor noise generated by all construction activities and ii) require noise reduction and attenuation measures if noise levels exceed that which could potentially harm or disturb marine mammals. We have stressed the most effective way to reduce noise during construction is to install quieter foundation types. If pile driving cannot be avoided, we encourage BOEM to work closely with the National Oceanic and Atmospheric Administration (NOAA) Fisheries on activities that could lead to greater levels of noise reduction during impact pile driving for future projects, as noise minimizing approaches during discrete phases of development have been identified by experts as the most promising solution to overcoming noise challenges associated with offshore wind development. Such activities may include the development of a noise reduction standard (akin to the German standard for harbor porpoise) that is tailored to protect species of concern in U.S. waters and designed to account for the larger diameter monopiles planned to be installed, as well as other project- and site-specific conditions in the United States. Given that underwater noise pollution negatively affects species across frequency hearing groups, in the pursuance of this standard we encourage BOEM and NOAA Fisheries to consider a hybrid approach, where risk is reduced for low-, mid-, and high frequencies, rather than solely at the low frequencies at which right whales are most vulnerable. A hybrid approach would help support overall marine ecosystem health rather than prioritize a single species or species group (i.e., low-frequency hearing cetaceans). To reduce impacts from noise produced by impact pile driving, BOEM indicates that the applicant will implement noise attenuation mitigation to reduce sound levels by a target of approximately 12 dB (re: 1 ?Pa2s) Sound Exposure Level (SEL) or greater.	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)."

Comment Number	Comment	Response
0095-3-02	why is the COP, submitted to BOEM in June 2022, substantially and significantly different from the proposed details related to Phase 2 presented to the Massachusetts Environment Protection Act, or MEPA, in September of 2022. These differences include descriptions of alternate sites considered, the means of transitioning cables to municipal roadways, the length of the construction period on proposed, and even variations on the number of cable landings on Dowses Beach from Commonwealth Winds' leased area in the OCS.	The applicant submitted a phased COP to BOEM on July 2, 2020, proposing the construction, operations, and decommissioning of offshore wind energy facilities for the proposed Project. A comprehensive update of the COP was submitted in December 2021, and subsequent updates were submitted in April, May, June, August, September, and November 2022. This Final EIS will inform BOEM's decision in the COP approval process. If its COP is approved, the applicant plans to begin construction in 2024. The purpose of BOEM's action is to determine whether to approve, approve with modifications, or disapprove the COP for the proposed Project. This purpose reflects BOEM's authority under the Outer Continental Shelf Lands Act (OCSLA) to authorize renewable energy activities on the OCS, as well as EO 14008; the shared goals of the Departments of Interior (DOI), Energy (DOE), and Commerce (DOC) to deploy 30 gigawatts (GW) of offshore wind energy capacity in the United States by 2030 while protecting biodiversity and promoting ocean co-use (White House 2021); and consideration of the goals of the applicant. BOEM will make this determination after weighing the factors in Subsection 8(p)(4) of the OCSLA that are applicable to plan decisions and considering the above goals.
0095-3-03	given the Department of the Interior's announcement on January 17th of the reorganization of regulatory oversight as it relates to a renewable energy, will the proposal be subjected to review by the Bureau of Safety and Environmental Enforcement?	To minimize the possibility of component failure, New England Wind will undergo an extensive and well-vetted structural design process based on site-specific conditions. As described in Sections 3.2.3.1 and 4.2.3.1 of COP Volume I, New England Wind's components are designed to international and US standards, which are identified in New England Wind's Hierarchy of Standards (see Appendix I-E). The Proponent will develop a Facility Design Report (FDR) containing the specific details of New England Wind's design and a Fabrication and Installation Report that describes how New England Wind's components will be manufactured and installed in accordance with the design criteria in the FDR. Both the FDR and Fabrication and Installation Report will be reviewed by a CVA, the Bureau of Ocean Energy Management, and the Bureau of Safety and Environmental Enforcement. Cop Vol II page 8-3
0095-6-03	one of the developers we talked to on the West Coast...is talking about buying the lease and selling it later, before construction starts. And we just had concerns, I guess, that if there were requirements attached to the lease, if a new buyer would have to live up to those requirements, because the contracts could be something outside of the lease that would not be part of that. So that transaction would guarantee something. First thing that comes to mind would be compensation.	The applicant and co-applicant is the permittee and the owner and/or co-owner of the entire project and would be responsible for the entire project. The applicant can transfer ownership, then the new owner will be the permittee responsible for the project.

O.5.23 Appendix B, Supplemental Information and Additional Figures and Tables

Table O.5-23: Responses to Comments on Appendix B, Supplemental Information and Additional Figures and Tables

Comment Number	Comment	Response
0095-5-05	I'm concerned about vibrations as far as the continental shelf is concerned. We're close to that continental shelf. We're only a blip on the screen. And those constant vibrations, I'm sure, have been evaluated	Impact producing factors on the Outer Continental Shelf (OCS) are mentioned throughout Appendix G. In addition, it is not anticipated that vibrations of construction or noise will affect the continental shelf due to depth limit of the piling driving and distance from the continental shelf.

O.5.24 Appendix C, Project Design Envelope and Maximum-Case Scenario

Table O.5-24: Responses to Comments on Appendix C, Project Design Envelope and Maximum-Case Scenario

Comment Number	Comment	Response
0055-02	It is unclear how the number and location of turbine placements and electrical service platform positions will be determined across the two project phases. Phase 1 includes multiple options for electrical service platforms while Phase 2 does not include any selected/preferred locations. We recommend analyzing multiple platform positions for each project phase. Also, it appears based on Figure ES-6 that approximately three turbine locations from lease area 501 not used for development of the Vineyard Wind 1 project may be assigned to Phase 1 of New England Wind. The Final EIS should explain the extent to which lease area 501 will be used for the proposed action. We also recommend that all figures use different colors for the Vineyard Wind 1 WTG positions in lease 501 to distinguish those from positions being used for New England Wind.	Up to 132 total foundations for 125 to 129 WTGs and 1 to 5 ESPs would be installed in 130 positions, generating at least 2,036 MW and up to 2,600 MW of electricity to meet existing and potential future offtake demands for New England states. This equates to an approximate minimum nameplate capacity of 16 MW per WTG. The applicant has not yet identified the nameplate capacity of the WTG, and the COP has identified the maximum capacity for the proposed Project to be approximately 2,600 MW using up to the maximum 130 positions within the lease area. If two ESPs are used for Phase 1, the applicant states that each ESP could occupy one of the 130 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). Similarly, if two or three ESPs are used for Phase 2, each ESP could occupy one of the 130 positions in the SWDA, or two of the ESPs could be co-located at a single position (COP Volume I, Sections 3.2.1.3 and 4.2.1.3; Epsilon 2022a). As a result, Phase 1 could include 63 foundations at 62 positions, and Phase 2 could include 89 foundations at 88 positions—a total of 132 foundations at 130 positions.
0055-05	We recommend foundation types that minimize the total construction footprint to reduce the amount of scour protection needed. We recommend the Final EIS include information on the amount of scour protection needed and the type of impact anticipated for each type of foundation for each of the phases to evaluate these tradeoffs. For example, comparing pile-driven (jacket or bottom-frame) versus suction bucket bases, the latter will have fewer acoustic impacts given the information provided in Volume 1, page S-11. We also recommend explaining why Phase 2 includes additional foundation types that are not considered in Phase 1. We assume this is depth-related, but the Draft EIS is unclear.	Section 2 of the Draft EIS indicated that scour protection for all foundations would be up to 9.8 feet high, would extend away from the foundation as far as 118 feet, and would consist of rock and stone at least 2.5 inches in diameter. To maximize precision when placing scour protection, the applicant would use the fall pipe method whenever feasible, as discussed in COP Section 3.2.1.5.4 (Volume I; Epsilon 2022a). The Draft EIS included the amount of acres of scour protection for the two Phases. As discussed in COP Vol I Section 4.2.1.2 and 4.2.3.3.3, jackets with suction buckets and bottom-frame foundations (with piles or suction buckets) are relatively immature technologies and have been used in offshore wind for only two small projects. While these technologies are not suitable for Phase 1 of this project from a risk and economic stand point, an initial screening analysis has indicated that they may be feasible for Phase 2.

Comment Number	Comment	Response
0055-11	The Draft EIS and Final EIS documents for this and other projects should evaluate a range of turbine MW sizes that are realistic for development. There are tradeoffs inherent in the selection of larger or smaller turbines. For example, larger turbines with pile-driven foundations will require larger impact hammers during installation, but the use of larger turbines will allow for fewer locations overall. As previously stated, it is unclear whether 16 MW and 13 MW turbines are being considered. Limiting the design envelope and associated analyses in the Final EIS to only one turbine size will limit evaluation of tradeoffs.	The size of the turbine is expected to change based on the technology at the time of the construction. The range of the turbine sizes is currently, 13-16 MW. The COP and EIS currently addresses available information in these ranges.
0055-30	The Draft EIS also mentions 13 MW turbines on page 3.7-37. It is unclear whether 13 MW or 16 MW will be used for both project phases and the Final EIS should clarify what is under consideration. This affects the minimum number of turbine positions that will be needed to meet the purpose and need of the project. We support consideration of higher MW turbines as this can reduce the footprint of the project, while still generating the same amount of power.	The size of the turbine is expected to change based on the technology at the time of the construction. The range of the turbine sizes is currently, 13-16 MW. The COP and EIS currently addresses available information in these ranges.
0081-21	The Draft EIS fails to provide simple information on the project envelope; turbine size or size range in megawatts is not anywhere in the Volume I or Appendix C: Project Design Envelope and Maximum-Case Scenario of the Draft EIS. In some places, 13 MW turbines are referenced, in others 16 MW name-plate capacity is proposed (Draft EIS p. 2-2). This information needs to be made clear to the public as turbine size is fundamental to the number of turbines that will be used in a project area...The turbine size should be easily available in the Executive Summary of the Draft EIS. Should the developer anticipate using the largest turbines available at the time of construction, this should be clearly stated and a range of anticipated turbine size should still be provided.	The size of the turbine is expected to change based on the technology at the time of the construction. The range of the turbine sizes is currently, 13-16 MW. The COP and EIS currently addresses available information in these ranges.
0083-71	Best available scientific information indicates that, during the operation phase, offshore wind turbines may generate noise audible and potentially impactful to large whales and other marine species over significant distances. Understanding levels and impacts of operational noise is an immediate research and monitoring priority as the first offshore wind projects are constructed in the United States. Pending further study, we recommend the use of direct drive turbines as opposed to turbines with a gear box. Direct drive turbines may emit lower noise levels and reduce risk of behavioral disturbance or habitat displacement of North Atlantic right whales and other marine mammal species, and also reduce impacts to key marine mammal prey species, during the operation phase of development.	Thank you for your comment.

O.5.25 Appendix E, Planned Activities Scenario

Table O.5-25: Responses to Appendix E, Planned Activities Scenario

Comment Number	Comment	Response
0055-09	Cumulative effects across projects are essential to evaluate when determining the impacts of placing cables in the western vs. eastern portion of Muskeget Channel. The impacts of Vineyard Wind 1, which is already under construction, and other future projects, such as Mayflower (SouthCoast) Wind's project, for which the COP is not yet available, will influence the overall impacts to benthic habitats in the channel. The size and number of turbines associated with the proposed action will influence the spatial extent of the project overall, and therefore will affect the magnitude of impacts. We recommend working with NOAA Fisheries habitat staff to optimize the final turbine, cable, and offshore substation locations to minimize impacts to habitat and fisheries.	BOEM has prepared the Final EIS under the National Environmental Policy Act (NEPA) (U.S. Code, Title 42, Sections 4321–4370f [42 USC §§ 4321–4370f). This Final EIS will inform BOEM's decision on whether to approve, approve with modifications, or disapprove the proposed Project's COP. Cooperating agencies may rely on this Final EIS to support their decision-making. In conjunction with submitting its COP, Park City Wind applied to the National Marine Fisheries Service (NMFS) for an Incidental Take Authorization (ITA) under the Marine Mammal Protection Act (MMPA) of 1972, as amended (16 USC § 1361 et seq.), for incidental take of marine mammals during proposed Project construction. NMFS needs to render a decision regarding the request for authorization due to NMFS' responsibilities under the MMPA (16 USC 1371 (a)(5)(A) and its implementing regulations. NMFS intends to adopt the Final EIS if, after independent review and analysis, NMFS determines the Final EIS to be sufficient to support the authorization, if appropriate. The U.S. Army Corps of Engineers (USACE) similarly intends to adopt the Final EIS to meet its responsibilities under Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act of 1899 (RHA).
0055-19	We also recommend the cumulative effects section include a more rigorous analysis of the impacts of noise generation from multiple wind farms during construction and operation with greater specificity on expected noise levels based on the size of turbines likely to be used. The conclusion that "the impacts could be measurable on a site-level scale but not within the entire proposed Project area" is not clear (page 3.6-33). Is this based upon only pile-driving noise and if so, what are the cumulative effects from operational noise from multiple wind farms? The study on page 3.6-28 mentions that "operational noise from several wind energy facilities with turbines up to 6.15 MW in nameplate capacity showed that operational noise generally attenuates rapidly with distance from the turbines" however the Proposed Action is considering 13-16 MW turbines. We do not think an impact determination should be based on a significantly smaller turbine size than what is being proposed for the project.	Thank you for your comment.

Comment Number	Comment	Response
0056-06	In identifying potential port facilities Table 2.1-4: Possible Ports Used during Phase 1 Construction, Operations, and Decommissioning, New England Wind failed to recognize New Bedford's second terminal dedicated to offshore wind. The New Bedford Foss Marine Terminal is a private venture that will add another base of operations and terminal logistics facility to support offshore wind projects off Massachusetts and the northeastern coast seaboard. The 30- acre site will undergo redevelopment this year and will provide storage and laydown yards for equipment and materials, berth facilities for tug and barge operations, and host crew transfer vessel (CTV) and service operation vessel (SOV) support services. It will create new office space for project teams and a marine coordination center for technicians involved in offshore wind projects. We encourage BOEM and New England Wind to extensively review both this site, as well as the New Bedford Marine Commerce Terminal and other current and future facilities within the Port of New Bedford, for a location for construction, assembly and fabrication, as well as future O&M activities. Both sites are well positioned geographically and provide extensive shoreside support.	Appendix E has been updated to identify the Foss Marine Terminal (which was one of the sites identified for potential use by the Massachusetts Clean Energy Center. The applicant has not committed to using the Foss Marine Terminal; therefore, it would be inappropriate to add this facility to Table 2.1-4.
0058-01	This impact of this and the other wind projects will change the coast of Massachusetts and Rhode Island forever. It is a threat to the North American Right Whales, the fisheries as we know them, and the dark skies. It is 1600 windmills and 30 years of construction for a technology will change before the first one is even built. The are better solutions for green energy.	Thank you for your comment.

Comment Number	Comment	Response
0083-09	[I]n addition to a thorough examination of direct and indirect impacts, assessing cumulative effects is essential to understanding the impact of offshore wind on species and ecosystems along the coast... It is important that the reasonably foreseeable impacts BOEM has chosen to assess be examined on the proper temporal and spatial area scope to ensure that cumulative effects are fully evaluated... We are concerned about the inconsistencies in the cumulative impacts analyses across Atlantic offshore wind projects. While these cumulative impact analyses generally include the same list of anticipated offshore wind projects (as seen in Table E-2), we find significant variability in the cumulative impacts by resource, even for the no action alternatives... We note that inconsistencies are also found for the geographic analysis areas for cumulative impacts. For example, the geographic analysis areas for birds and bats vary from 0.5 mi inland (Sunrise Wind for birds and bats, New England Wind for birds), 5 mi inland (New England Wind for bats and several other Draft EISs for both birds and bats), to 100 mi inland (Vineyard Wind 1 for both birds and bats). BOEM should improve their analyses to ensure a high standard and consistency for their cumulative impact analyses for offshore wind projects.	Appendix E of the Draft EIS stated that 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]). This appendix discussed 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).
0083-128	We also urge BOEM to also ensure that in evaluating [cumulative] impacts to species, the agency considers potential changes in range and seasonal use due to various anticipated levels of warming and climate change.	Appendix E of the Draft EIS stated that 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]). This appendix discussed 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).
0084-01	we already have two landings in the Town of Barnstable. Our Town is currently making a considerable contribution to renewal energy goals and doing more than any other community on the Cape. Asking the residents to hand over a THIRD publicly owned recreational area to a for-profit international company is unreasonable	Thank you for your comment.

O.5.26 Appendix H, Mitigation and Monitoring

Table O.5-26: Responses to Comments on Appendix H, Mitigation and Monitoring

Comment Number	Comment	Response
0028-05	APCC calls on Avangrid, government agencies and key stakeholder groups to continue to collaborate on developing and improving protocols for avoiding impacts to bird, marine mammals and turtles and to further adopt effective mitigation programs to address any impacts that may occur. BOEM should impose requirements that utilize the most advance science to ensure protection of these species. This is particularly important in the effort to protect the critically endangered North Atlantic right whale from potential project impacts.	Thank you for your comment.
0032-02	With the availability of these direct support resources for related research, we strongly encourage AVANGRID to initiate a long-term planning strategy for the major maintenance, decommissioning, and replacement of the offshore wind infrastructure. Given the evolution of new technologies and resources, and the time horizon before this occurs, a proactive approach to removing turbines, turbine blades, concrete, cables, and other accoutrements of the industry and determining how this material is repurposed, recycled, or disposed of, will require collaboration among other industry partners, educational institutions, the community, and policymakers as we continue to support the Blue Economy and reduce our planet's carbon footprint.	Decommissioning plans and timelines were discussed in Section 2 of the Draft EIS. The decommissioning approach is unchanged from the Draft EIS; therefore, no changes to the Final EIS were necessary. Further, additional NEPA analysis will be conducted prior to making a determination on the decommissioning application that needs to be submitted for purposes of authorizing decommissioning activities, including the methods to be used.
0032-03	we recognize the COP's Mitigation Measure (#24) in establishing the Offshore Wind Protected Marine Species Mitigation Fund. As presently defined, this fund should also include specific acknowledgement of the shellfish habitat and related aquaculture industry in the region...While the study indicates the potential impact "is less significant in sandy areas that are strongly influenced by tidal currents and waves," (Draft EIS, 3.4-5) consideration for including a portion of the mitigation fund for research and support for understanding the implications on the shellfish industry and aquaculture should be given.	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

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0055-21	The Councils are concerned with the scour protection measures included within the Draft EIS (e.g., rock placement, concrete mattress protection, half-shell) and that "BOEM assumes that up to 10 percent of the cables may not achieve the proper burial depth and would require cable protection in the form of rock placement, concrete mattresses, and/or half-shell" (page 3.9-11). Appendix H (Table H-1) states that "cable protection measures within complex hard-bottom habitat...will consist of natural or engineered stone that does not inhibit epibenthic growth and provides three-dimensional complexity." Per the Council's offshore wind energy policy, we recommend that if scour protection or cable armoring is needed, the materials should be selected based on value to commercial and recreational fish species. Natural materials, or materials that mimic natural habitats, should be used whenever possible. These materials should not be obtained from existing marine habitats and must not be toxic.	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).
0055-22	We recommend clarifying whether different materials are being considered as a mitigation measure as compared to what is planned as part of the proposed action. We appreciate that scour protection performance will be evaluated but we are not clear whether performance monitoring is in relation to protecting the cable from exposure or performance in terms of rates of benthic recovery. If the former, then we recommend this be done on a more frequent basis and at more locations than the proposed 20% of locations every 3 years (Appendix H). If the latter, then three-year intervals may be reasonable.	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.

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0055-24	Exposed UXO presents a significant risk to mariners, especially those towing mobile gear that could bring UXO to the surface. Offshore wind project construction activities can uncover UXO devices. We recommend that the terms and conditions specify that developers are responsible for the safe disposal of UXO exposed due to construction activities. Our understanding is that some UXOs might be detected via surveys but are not exposed; in such cases, only mariner notification may be sufficient given disposal may present greater risks. Clear, timely, and repeated communication about UXO locations and any changes in the location or status of UXOs is essential and should not rely only on email notifications.	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).

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0055-25	Appendix H includes several compensation-related mitigation measures for Phase 1, as negotiated with CT during project procurement, including: establishment of an offshore wind protected marine species mitigation fund, providing up to $2.5 million to support fisheries research and education; up to $7.5 million to support environmental initiatives, assist Connecticut fishermen, and support local communities in Connecticut; and $26.5 million to support the economic and community initiatives (workforce development, supply chain integration, etc.) (Table H-1). We support these types of compensation measures but note that fishermen from multiple states fish in the project area and compensation for these individuals may also be needed. The vast majority of commercially harvested fish (pounds and revenue) for the project area is landed in RI and MA8 . The table in Appendix H also mentions that additional economic and community initiatives will be developed for Phase 2. Compensation to be provided for Phase 2 should be fully described in the Final EIS. We recommend including how these compensation measures will affect the impact determinations and overall conclusions in the Final EIS.	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).
0055-26	The Final EIS should also establish a compensation fund and process for all wind projects to address all relevant impacts to commercial, for-hire, and private recreational fishing, as well as shoreside commercial and recreational fishery support businesses. Relevant impacts include, but are not limited to, adverse impacts on revenues, costs, travel times, and the value of permits and vessels. It is also important to consider that many individuals other than captains, permit holders, and business owners will be impacted (e.g., crew members, processing plant employees); however, not all individuals will have the documentation necessary to demonstrate the degree of income impacted by specific wind projects.	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

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0055-27	Appendix H states that "all survey and monitoring work will be publicly available" and that "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" (page H-4). We strongly urge that the survey data are also made publicly available. We are supportive of the scientific survey mitigation measures for recurring surveys; however, more detail should be provided on these measures, how these measures will be funded and executed, and the overall impact the measures will have on existing surveys and use of the survey data to inform fisheries management.	Thank you for your comment.
0055-39	Mitigation measures are necessary to reduce the potential negative environmental and socioeconomic impacts of the New England Wind project. The recommendations outlined in our offshore wind energy policies, referenced above, should be reflected as terms and conditions for approval of the project. We provided a separate comment letter on the draft Guidelines for Mitigating Impacts to Commercial and Recreational Fisheries. These comments supported many of the mitigation measures recommended in that draft guidance. We recommend that all final mitigation guidelines be reflected in terms and conditions for BOEM's approval of this project.	Thank you for your comment.
0055-40	the Draft EIS states that "the applicant would bury the proposed offshore export cables within the OECC to a target depth of up to 5 to 8 feet below the seafloor" (page 3.5-18). BOEM's draft fisheries mitigation guidelines recommend a minimum cable burial depth of 6 feet. The Councils have not endorsed a specific burial depth, but rather have recommended depths that are adequate "to reduce conflicts with other ocean uses, including fishing operations and fishery surveys, and to minimize effects of heat and electromagnetic field emissions" (from the BOEM Draft Fisheries Mitigation Guidance). Assuming a depth of 6 feet is sufficient to address these objectives, we recommend the Final EIS include this target burial depth as the minimum end of the range.	The project design envelope as presented in the applicant's COP is for the offshore export cables to be installed at a target burial depth of 5 to 8 feet below the seafloor.
0056-02	we support New England Wind's proposal to collect pre-construction fisheries data...We recommend that this collaboration take place during the construction and post-construction phase of the project as well. New England Wind will be committing up to $2.5 million to support fisheries	Thank you for your comment.

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	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. We advocate that a similar investment be made to the University of Massachusetts Dartmouth School of Marine Science and Technology, which has been on the front lines of offshore wind research and has decades of experience researching and analyzing fisheries in the Northeast. To have a cooperative research model be successful, many federal, state and local entities must be involved, as well as our fishermen who have complete knowledge of our waters and resources and have been committed and responsible stewards of a sustainable fishery for decades.	
0056-04	The current lack of fisheries mitigation and compensation measures on the industry as whole is somewhat troubling, but we will expect New England Wind to fully comply with any new guidelines and guidance that BOEM is currently finalizing as noted in Appendix H to the Draft EIS. While we appreciate the inclusion of the reference to BOEM's draft mitigation Guidance, as we have noted in the past, a five (5) year period for lost fishing income during operation is not sufficient to address the losses that will be suffered by fishermen and the associated shoreside businesses. We strongly encourage BOEM to require mitigation for lost revenue much longer into the 30-year lifespan of the project.	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)."
0056-05	we appreciate the applicant's plans to employ a Marine Operations Liaison Officer, who will be responsible for safe marine operations in coordination with maritime partners and stakeholders (e.g., the USCG, U.S. Navy, port authorities, state and local law enforcement, marine patrol, commercial operators, etc.). We encourage other developers to follow suit and we will expect multi-project coordination in these efforts.	Thank you for your comment.

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	Likewise, it is encouraging that the applicant will implement a local hiring plan to maximize its direct hiring of residents of southeastern Massachusetts and Connecticut in coordination with unions, training facilities, and schools.	
0080-03	We look forward to negotiating a Community Benefits Agreement with New England Wind that addresses impediments to work access in our community: childcare, transportation, and training programs.	Thank you for your comment.
0081-17	The Draft EIS provides specific information on boulder removal/relocation. More clarity should be provided on when a boulder will be removed or relocated. Areas proposed for relocation should be vetted by the fishing industry to avoid placing obstructions in fishing grounds. When a boulder is relocated, the exact original location and the location where it is being moved need to be communicated to the fishing industry... Failure to communicate the exact locations of relocated boulders will impact safety-at-sea and increase the likelihood of gear loss and lost fishing time while making necessary repairs.	Thank you for your comment.
0081-19	Collaborative layout planning, while critical to reducing some impacts, cannot fully mitigate all avoidable conflicts. Full-scale mitigation must be required as part of this process. This would include environmental mitigation, particularly full decommissioning (not conceptual, as BOEM refers to decommissioning) where the environment is restored to its original state at the end of the lease period including removal of all cables, gravity bases, turbine components, and protection methods.	Decommissioning plans and timelines were discussed in Section 2 of the Draft EIS. The decommissioning approach is unchanged from the Draft EIS; therefore, no changes to the Final EIS were necessary. Further, additional NEPA analysis will be conducted prior to making a determination on the decommissioning application that needs to be submitted for purposes of authorizing decommissioning activities, including the methods to be used.
0081-28	Compensation for gear loss or damage as a result of interactions with the Project should be assured. Language should be added which allows fishery participants to be compensated for all gear loss and damage resulting from interactions with infrastructure supporting an OSW facility. Exceptions would exist for interactions which are intentional or the result of gross negligence on the part of the vessel operator. There are a number of things outside of the operator's control which could result in interactions with infrastructure and facilities supporting OSW... Mechanical failures, abrupt and unforeseeable changes in wind or current, etc. could all result in interactions with facilities supporting an offshore wind array. Interactions which would not have occurred but for the presence of the array should be fully compensable to such fishermen.	Thank you for your comment.
0081-30	In developing Mobile Gear-Friendly Cable Protection Measures, developers must engage with fishery participants in an effort to understand their needs. In particular, bottom tending gear such as surfclam and scallop dredges, bottom-trawl and others should be consulted to mitigate impacts to fleets utilizing that gear type. This may	Thank you for your comment.

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	result in preferred orientation of subsea cables and cable protection or other recommendations from operators in the region should they choose to continue fishing in a project area.	
0081-31	The Fisheries Communication Plan (FCP) for New England Wind focuses primarily on informational meetings and information dissemination. While this is an important component of any FCP, we again reiterate the importance of having a two way communication flow to ensure that fishermen are authentically included. The first step must be the development of written commitments that the developer and their representatives respect the input, inclusion and limited available time to participate in meetings.	Thank you for your comment.
0081-35	RODA is encouraged that a bond is to be held by the U.S. government to cover the costs of decommissioning. BOEM should disclose the bond amount to the public along with the estimated costs of decommissioning, to allow the public to consider the sufficiency of the bond and ease or raise any concerns over responsibility for uncovered expenses. Additional information on how the turbines will be disposed of after decommissioning should be provided and analyzed in future documents including the EIS.	Decommissioning plans and timelines were discussed in Section 2 of the Draft EIS. The decommissioning approach is unchanged from the Draft EIS; therefore, no changes to the Final EIS were necessary. Further, additional NEPA analysis will be conducted prior to making a determination on the decommissioning application that needs to be submitted for purposes of authorizing decommissioning activities, including the methods to be used.
0083-116	New England Wind proposes several mitigation and monitoring measures for benthic resources, invertebrates, finfish, and EFH. These include: (1) a benthic monitoring framework; (2) sensitive habitat avoidance; (3) sensitive habitat map distribution; and (4) pre-construction, construction and post- construction fisheries surveys. BOEM also lists the following potential mitigation and monitoring measures: (1) plankton surveys; (2) post-construction monitoring to document habitat disturbance and recovery at offshore WTG foundations; (3) anchoring plans; (4) optical surveys of benthic invertebrates and habitat; (5) consideration of any new data on benthic habitats and consultation with relevant agencies when refining the benthic monitoring plan, including an evaluation of whether cable protection is mitigating impacts to juvenile cod HAPC; and (6) evaluation of additional benthic habitat data prior to cable laying. We support these measures... to reduce impacts to benthic habitats, finfish, and EFH.	Thank you for your comment.
0083-21	We note that many of the proposed monitoring and mitigation plans found in this Draft EIS are general at this point, relying on yet-to-be-developed plans. We urge BOEM to use the recommendations herein to require protective measures and to allow practices to evolve as monitoring informs impact assessments.... Responsible development of offshore wind includes applying a framework of avoiding, minimizing, mitigating, and monitoring impacts to wildlife and wildlife habitat. Even	Thank you for your comment.

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	with best efforts to gather and consider all relevant information, considerable uncertainty exists about how offshore wind will affect habitats and wildlife and we therefore urge New England Wind to support conservation efforts for potentially impacted species and habitats.	
0083-44	With respect to the pre-construction, construction and installation, and post-construction fisheries surveys, the Draft EIS provides few details but notes that New England Wind, in cooperation with University of Massachusetts Dartmouth School of Marine Science and Technology, will conduct trawl and drop camera surveys within the SWDA and OECC and will develop a framework for the studies in coordination with other developers. The Draft EIS also provides few details on the benthic monitoring framework. At a minimum, for these monitoring measures, BOEM should require New England Wind to conduct the necessary pre-construction, construction, and post-construction monitoring of benthic habitats and associated flora and fauna to detect any physical changes and impacts to habitats and species that occur because of construction activities, the presence of WTG structures in the water columns, hydrodynamic effects, and other impacts. The monitoring plan should also evaluate impacts to juvenile cod HAPC and, as suggested in the Draft EIS, whether cable protection is mitigating impacts to these habitats. As described in the Draft EIS, New England Wind should further consider any new data on benthic habitats when refining the benthic monitoring plan and be required to consult with NMFS and the Massachusetts Department of Environmental Protection, and address any agency comments, before finalizing the benthic monitoring plan. BOEM should also require New England Wind to undertake the proposed optical surveys of benthic invertebrates and habitat, plankton surveys, and post construction benthic habitat disturbance monitoring, as these measures will increase our understanding of the general impacts of offshore wind on benthic resources, finfish, EFH, and invertebrates, including the hydrodynamic effects and potential long-term effects of offshore wind development.	Thank you for your comment.
0083-45	New England Wind plans to provide contractors with a map of sensitive habitats to allow them to plan mooring positions to avoid such habitats, and require that vessel anchors and legs avoid eelgrass beds and hard/complex bottom, as long as such avoidance does not compromise the vessel's safety or the cable's installation. Moreover, under the potential anchoring plan, New England Wind would develop a plan to avoid construction impacts on sensitive habitats, including hard-bottom and structurally complex habitats. The plan would include the planned location of anchoring activities, sensitive habitats and location, etc. The	Thank you for your comment.

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	Draft EIS also explains that New England Wind may conduct additional evaluation of benthic habitat data prior to cable laying, including 75 benthic grabs over the entire length of the OECC (with approximately 42 in the eastern Muskeget Channel region) and 60 underwater video transects over the entire length of the OECC (with 28 transects in the eastern Muskeget Channel region). New England Wind would use this information to avoid siting the OECC route in sensitive habitats to the maximum extent practicable. Because these three measures would help further avoid, minimize, and mitigate impacts to sensitive benthic habitats, BOEM should require them.	
0083-46	Due to the predominance of complex habitat in Muskeget Channel, the area may be an Atlantic cod spawning ground. Therefore, BOEM should consider conducting Atlantic cod spawning surveys and deploying passive acoustic monitoring capable of detecting the vocalizations of spawning cod in the area of Muskeget Channel to further our understanding of the impacts of offshore wind on cod spawning. Monitoring measures to detect the presence of spawning cod in Muskeget Channel and any impacts from offshore wind development is especially important because of cod spawning site fidelity. Cod spawning monitoring could inform the development of adaptive management mitigation measures to reduce impacts, if needed. For example, if based on monitoring, BOEM determined that time-of-year restrictions on cable emplacement activities in Muskeget Channel would reduce impacts to cod spawning, BOEM should require New England Wind to implement such adaptive restrictions on construction activities in Muskeget Channel.	Thank you for your comment.
0083-69	As an initial matter, our groups are concerned with the lack of detail about the mitigation measures mentioned in the Draft EIS. Several of the mitigation measures described in Appendix H of the Draft EIS lack specificity or are yet to be finalized. For example, rather than require specific monitoring and mitigation measures as part of the Draft EIS, BOEM states that it will require the applicant (1) to develop mitigation and monitoring measures similar to those in the Vineyard Wind COP; (2) to submit a pile-driving monitoring plan to BOEM and NMFS for review and approval a minimum of 90 days prior to the commencement of activities; and (3) to prepare and submit a passive acoustic monitoring (PAM) plan describing all equipment, procedures, and protocols to BOEM and NMFS at least 90 days prior to initiation of pile-driving activities. These "plans" will not be made available for public comment. BOEM cannot expect the public to refer to Vineyard Wind's COP to find specifics about potential mitigation measures or wait until mitigation	Thank you for your comment.

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	plans are finalized to understand the impact of proposed activities on marine mammals and sea turtles.	
0083-70	"As stated in Section 3.B.2, it is not clear from the Draft EIS what BOEM is conditioning its permit for New England Wind on a specific level of noise reduction. Even at the 12 dB target level, noise reduction and attenuation falls below what can now be achieved with best available noise control technology and we recommend BOEM strengthen its requirements to maximize the level of noise reduction during construction. As described in Bellman et al. (2020) and Bellman et al. (2022), noise reduction levels achieved in Europe through the combined use of NAS (one positioned in the near-field and one in the far-field) have reached a 20 dB (re: 1 ?Pa2s) reduction in SEL, or greater. A combination of the IHC Noise Mitigation Screen (IHC-NMS) and an optimized big bubble curtain (BBC) has proven among the most effective to date, with a minimum, average, and maximum reduction in sound exposure level (?SEL) of 17, 19, and 23 dB, respectively. The deployment of a combination NAS (i.e., two different systems) is considered by those authors to be ""state of the art"" in terms of SEL reduction and is also important for attenuating sound across a range of frequencies and maximizing transmission loss.	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).
0083-72	vessel strikes are a leading cause of large whale injury and mortality...Vessel strikes also pose a significant risk to other large whale species currently experiencing UMEs, such as humpback and minke whales, as well as endangered fin whales and sei whales, and sea turtles. Short of entirely eliminating vessels from an area, reducing speeds to 10 knots or less for all vessels is currently the only known way to reduce the risk of injury and mortality to marine mammals and sea turtles from vessel strikes. We therefore urge BOEM to implement a mandatory, year-round 10 knot speed restriction on all Project vessels associated with New England Wind at all times (except in Nantucket Sound unless a Dynamic Management Area (DMA) is designated)...[Existing] measures still leave right whales vulnerable to vessel strike outside of the November 1-May 14 period and are reliant on a consistently high probability of real-time detection of right whales in order to trigger the designation of DMAs, which likely cannot be attained at a level that	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

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	would detect every single animal based on currently available technology. We note that NMFS has proposed a new, larger "Atlantic Seasonal Speed Zone (SSZ)" that would completely cover New England Wind's project Area from November 1 through May 30, as part of a Proposed Rule to amend the Vessel Speed Rule. Several of our groups spoke in strong support of the proposed amendments to the Vessel Speed Rule–with certain improvements, as detailed in our letters–because they would significantly reduce the risk of mortality and injury of right whales from vessel strike. However, the Proposed Rule is not yet in effect, and there is no guarantee it will be finalized as written. Moreover, even if the Atlantic SSZ is implemented as proposed, current evidence demonstrates that right whales may be at risk of vessel strike year-round, including outside of the November 1-May 30 season.	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).
0083-73	Feeding behaviors have been observed in and close to the New England Wind Project Area by virtually all whale species and small cetaceans regularly occurring in this area. Oceanographic studies in the area, which were part of the NLPSC campaigns, confirmed the presence of a zooplankton community composition similar to that of Cape Cod Bay, which is a known hotspot for right whale feeding. A feeding BIA for fin whales is designated March to October east of Montauk Point and feeding humpback whales are regularly observed, particularly during March and April. Courtship behaviors in the area have also been observed by humpback whales. Based on these above-described findings of right whale habitat use, and the importance of the area for multiple age classes, socializing animals, and most importantly as core foraging habitat, we recommend BOEM extend the time period of the proposed seasonal restriction to December 1 through April 30 to reflect the period of highest detections of vocal activity, sightings, and abundance estimates of North Atlantic right whales. We also underscore that the species should be expected to be found throughout the year in and close to the Project Area, and the most stringent impact avoidance, minimization, and mitigation are required to protect this species at all times during potentially harmful construction activities."	Thank you for your comment.
0083-74	We therefore appreciate BOEM prohibiting New England Wind from initiating impact pile driving within 1.5 hours of civil sunset and this requirement should be carried forth to the Final EIS...We are supportive of this approach only if initiation of impact pile driving at night is prohibited unless the alternative monitoring plan is approved, and only if the technologies and methodologies proposed are independently and scientifically proven (i.e., via peer-reviewed scientific study) to have detection rates that are equally or more effective than can be achieved by monitoring during daylight hours with good visibility conditions. BOEM	Thank you for your comment.

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	should clearly lay out in the Final EIS what information is required to be provided by the developer, and what criteria BOEM and NMFS will use to evaluate its reliability. BOEM should also consider that vessels operating at night may be more likely to strike a right whale or other large whale species due to a lack of detectability.	
0083-76	Following the mitigation hierarchy, we believe BOEM should prioritize impact avoidance and consider alternatives that use quiet foundation technologies that avoid pile driving noise entirely and significantly reduce noise impacts to marine mammals and other marine life overall. As we noted previously in these comments and in our past comments on other projects, BOEM and the developer should provide more detailed analysis to support the elimination of these technologies from consideration. Quiet foundation types can afford developers significant flexibility in the construction schedule, including potentially year-round and 24-hour construction in some areas. In our view, these incentives should be fully explored by BOEM and industry.	Thank you for your comment.
0083-80	Unexploded ordnance may be encountered on the seabed in the process of developing the Project in the lease area and/or along the export cable routes. UXOs may require removal through explosive detonation, which could cause disturbance and injury to marine mammals and sea turtles. BOEM states that no auditory injury or mortality is expected for any species "[d]ue to the proposed mitigation and monitoring measures (Appendix H) and the relatively small size of the peak pressure and acoustic impulse threshold ranges compared to PTS and TTS ranges for potential UXO detonations." However monitoring and mitigation measures specific to UXO detonations are not included in the Appendix H, and BOEM's lack of analysis for UXO detonations for New England Wind does not comport with how this activity has been analyzed in recent and concurrent Draft EIS's for other offshore wind projects. BOEM must provide a complete analysis of potential impacts from UXOs and a full description of monitoring and mitigation measures required for this activity in the Final EIS.	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).

Comment Number	Comment	Response
0083-81	Entanglement in abandoned fishing gear contributes significantly to mortality and serious injury of marine mammals and sea turtles, particularly the North Atlantic right whale. In fact, mortality due to fishing gear entanglement may actually be higher than estimated due to cryptic mortality. We encourage BOEM and the developer to create a marine debris mitigation plan in addition to the existing requirement that vessel operators, employees, and contractors complete marine debris awareness training. In addition, BOEM should fully describe the mitigation and monitoring measures that the agency intends to require in the Final EIS to reduce entanglement risk posed to sea turtles from fishing gear and marine debris.	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).
0083-93	The Mitigation and Monitoring plan does not fully measure nocturnal bird or bat traffic. Acoustic sensors can identify species passing through the turbine area but cannot reliably count large flocks, identify migrating birds that do not call in-flight, or separate species with similar calls. Integrating acoustic data with camera technologies and/or radar systems is required to fully measure migrant traffic and identify all species, as well as providing valuable supplementary data on number of individuals, flight speed, and flight height.	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

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		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).
0083-94	The Mitigation and Monitoring plan does not address comprehensively micro-scale collision or avoidance. New England Wind states it will consider installing anti-perching devices on offshore wind structures to reduce bird perching locations. Comprehensive collision monitoring is key to assessing effects of wind turbines, but here collision detection of birds is limited to opportunistic carcass surveys on platforms and vessels. Such surveys would fail to record any (and very likely most) bird strikes in which carcasses do not land on a fixed or floating structure. Provision for an automated, multi-sensory monitoring system will better enhance understanding of avian and bat activity by tracking micro-avoidance or -attraction behaviors, gauging species composition at the New England Wind site (both diurnally and nocturnally), and detecting movement flux rates. for individual aerial wildlife through at least some portion of the project site.	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).
0083-95	The Mitigation and Monitoring plan limits individual tracking to ESA-listed species. There are important reasons to track non-listed avian species. In cases where welfare concerns or rarity preclude the tracking of listed species, non-listed substitutes can substitute (e.g., Common Terns for Roseate Terns). Some marine bird species that are globally threatened or endangered under the International Union for the Conservation of Nature Red List are not listed under the ESA because of listing delays or because they breed elsewhere. Regardless of listing status, species with high vulnerability to offshore wind or with uncertain population trends should be included in Motus studies to better measure	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.

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	migratory connectivity and determine appropriate locations for population monitoring.	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).
0083-96	The Mitigation and Monitoring plan does not identify acceptable levels of mortality, or displacement, or describe potential mitigation activities that could offset such impacts when and where they were to occur to the most susceptible species. The monitoring framework for offshore birds does not directly address the mitigation actions that might be needed for any observed collision or displacement effects, what level of observed impact would trigger such measures, or the kind of habitat and/or resource equivalency analysis that would be implemented for computing the offsets used for any restoration actions.	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).

O.5.27 Appendix K, References Cited

Table O.5-27: Responses to Comments on Appendix K, References Cited

Comment Number	Comment	Response
0006-02	https://www.nature.org/content/dam/tnc/nature/en/documents/TurbineReefs_Nature-BasedDesignsforOffshoreWind_FinalReport_Nov2021.pdfhttps://tethys.pnnl.gov/wind-energy-monitoring-mitigation-technologies-tool?wind_hierarchy=All&wind_industry=All&wind_phase=All&wind_stressor=All&wind_receptor=All&field_development_status_target_id=All&wind_status=All&search=econcrete	Thank you for your comment.
0023-14	LeBlanc, D., J. Guswa, M. Frimpter and C. Londquist (1986) Ground water resources of Cape Cod, Massachusetts. U.S. Geological Survey Hydrologic Investigations Atlas HA-692, U.S. Geological Survey, Reston, VA. Masterson, J. P. and Portnoy, J. W. (2005) Potential Changes in Ground-Water Flow and their Effects on the Ecology and Water Resources. Olcot, P. G. (1995) Ground Water Atlas of the United States, "Connecticut,Maine,Massachusetts, New Hampshire, New York,Rhode Island,Vermont, HA730-M, Regional Summary". Available at URL: HTTP://capp.water.usgs.org	Thank you for your comment.
0034-10	"New Bedford Foss Terminal Opening to Support Offshore Wind," press release, 23 March 2022. South Coast Today, Gallerani, Kathryn, "New Bedford Ocean Cluster: Marine industries can work together to help each other 'thrive'", 27 September 2022. BOEM, p. E-29 New Bedford MCT North Terminal The White House, Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad," President Joseph Biden, 27 January 2021. WPRI, Walsh, Kait and DaSilva, Melanie, "New Bedford offshore wind industry to bring thousands of jobs," 26 April 2022. BOEM, p. 3.5-24 paved area BOEM, p. 3.7-1, p. 3.7-4 Marine Mammal Characteristics NOAA Fisheries, North Atlantic Right Whale Nantucket Current, Graziadel, Jason, "Ferries, Fishermen, Alarmed by Proposed Right whale Speed Restrictions," 19 September 2022. BOEM, pp. 3.4-7, 3.4-1 Benthic resources Columbia Climate School, State of the Planet, Cho, Renee, "Five Things the Energy Transition Can't Do Without," 7 December 2022. Columbia Climate School, State of the Planet, Toh, Lucas, "Let's Come Clean: The Renewable Energy Transition Will Be Expensive," 26 October 2021. The Guardian, Poonia, Gitanjali, "How the rise of copper reveals clean energy's dark side," 9 November 2021. The Brown Daily Herald, Sender, Gabriel, "Sender '25: Block Island Wind Farm shows that Rhode Island still needs nuclear," 11 April 2022. National Wind Watch, Collins, David, "The Block Island wind farm has largely shut down," 7 August 2021. American Association for the Advancement of Science (AAAS), Bates, Mary, Ph.D., "Noise pollution also threatens fish," 1 October 2012. PhysdotOrg, "Fish exposed to noise pollution likely to die early: study," 16 September 2020. Hakai Magazine Coastal Science and Societies,	Thank you for your comment.

Comment Number	Comment	Response
	Kemeny, Richard, "Marine Noise is Mentally and Physically Disturbing Fish" 6 April 2018. Journal of Fish Biology, Popper Arthur N. and Hawkins, Anthony D., "An overview of fish bioacoustics and the impacts of anthropogenic sounds on fishes," 12 March 2019. Mongabay, Alberts, Elizabeth Claire, "For marine life, human noise pollution brings 'death by a thousand cuts'," 9 February 2021. Discover Magazine, Hellweg, Max Aguilera and McCarthy, Susan, "Killing Whales with Sound," 1 April 2002. BOEM, pp. 3.7-35, 3.7-36 moderate impacts on marine mammals Brattle Group, Pfeifenberger, Johannes, Newell, Sam, Graf, Walter and Spokas, Kasparov, "Offshore Wind Transmission: an analysis of planning in New England and New York," 23 October 2020. BOEM, p. E-30 Offshore transmission cables construction and maintenance Integral Consulting, Preziosi, Damian, "EMF Risks from Offshore Wind: A Complete Understanding," 6 September 2022	
0053-02	HTTPS://www.utilitydive.com/news/5-new-England-states-propose-modular-transmission-plan-to incorporate-84/631199/	Thank you for your comment.
0074-07	CZM, Terrell, Megan, “Strategic Plan for Mapping Massachusetts’ Benthic Marine Habitats,” May 2004. Cape Cod Times, Bruemmel, Marty, “YOUR TURN: Time to close the circle on Nantucket Sound,” 16 January 2022. Center for Coastal Studies, “Threats to the Bay and Sound.” Chesapeake Bay Program, “Life at the Bottom.” Fugro, English, Paul, “ Benthic Ecological Impacts of Offshore Wind.” JSTOR, Box, Olivia, “How Wind Energy Could Affect Marine Ecosystems,” 13 September 2021. Marine Environmental Research, Mavraki, Ninon, Degraer, Steven, Moens, Tom and Vanaverbeke, Jan, “Functional differences in tropic structure of offshore wind farm communities: A stable isotope study,” 26 December 2019. NOAA Fisheries, “Offshore Wind Energy: Protecting Marine Life.” NOAA Fisheries, “The Importance of Eelgrass,” 7 November 2014. Provincetown Center for Coastal Studies, Coastal Solutions Initiative, “Toward an Ocean Vision for the Nantucket Shelf Region,” January 2005. Seaside Sustainability, Klavinger, Sabrina, “Benthic Habitat Mapping to Understand Ecosystems,” 2 May 2022. SEER, “Benthic Disturbance from Offshore Wind Foundations, Anchors, and Cables,” 28 February 2022. The CaPE Lab, The Coastal Processes and Ecosystems Laboratory, “Dr. Agnes Mittermayr,” January 2018. The University of Rhode Island, Offshore Renewable Energy, Vanaverbeke, Jan, “How do Offshore Wind Structures Affect Marine Ecology in Benthic Zones,” 31 August 2020. The University of Rhode Island, Offshore Renewable Energy, “How do offshore wind turbines change the seafloor? In what ways does this affect the associated marine communities?” The White House, Biden, Joseph R., Executive Order 14008, “Tackling the Climate Crisis at Home and Abroad,” 27 January 2021. ThoughtCo, Kennedy, Jennifer, “Understanding How to Classify a Sessile Organism,” 6 September 2017. Wikipedia, Benthos.	Thank you for your comment.

Comment Number	Comment	Response
0082-05	Review attachments provided by sender: Grid Innovation Program Concept Paper – Joint State Innovation Partnership for Offshore Wind, dated January 13, 2023	Thank you for your comment.
0085-02	https://nap.nationalacademies.org/catalog/26430/wind-turbine-generator-impacts-to-marine-vessel-radar	Thank you for your comment.
0086-19	"New Bedford Foss Terminal Opening to Support Offshore Wind," press release, 23 March 2022. South Coast Today, Gallerani, Kathryn, "New Bedford Ocean Cluster: Marine industries can work together to help each other 'thrive'", 27 September 2022. BOEM, p. E-29 New Bedford MCT North Terminal The White House, Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad," President Joseph Biden, 27 January 2021. WPRI, Walsh, Kait and DaSilva, Melanie, "New Bedford offshore wind industry to bring thousands of jobs," 26 April 2022. BOEM, p. 3.5-24 paved area BOEM, p. 3.7-1, p. 3.7-4 Marine Mammal Characteristics NOAA Fisheries, North Atlantic Right Whale Nantucket Current, Graziadel, Jason, "Ferries, Fishermen, Alarmed by Proposed Right whale Speed Restrictions," 19 September 2022. BOEM, pp. 3.4-7, 3.4-1 Benthic resources Columbia Climate School, State of the Planet, Cho, Renee, "Five Things the Energy Transition Can't Do Without," 7 December 2022. Columbia Climate School, State of the Planet, Toh, Lucas, "Let's Come Clean: The Renewable Energy Transition Will Be Expensive," 26 October 2021. The Guardian, Poonia, Gitanjali, "How the rise of copper reveals clean energy's dark side," 9 November 2021. The Brown Daily Herald, Sender, Gabriel, "Sender '25: Block Island Wind Farm shows that Rhode Island still needs nuclear," 11 April 2022. National Wind Watch, Collins, David, "The Block Island wind farm has largely shut down," 7 August 2021. American Association for the Advancement of Science (AAAS), Bates, Mary, Ph.D., "Noise pollution also threatens fish," 1 October 2012. PhysdotOrg, "Fish exposed to noise pollution likely to die early: study," 16 September 2020. Hakai Magazine Coastal Science and Societies, Kemeny, Richard, "Marine Noise is Mentally and Physically Disturbing Fish" 6 April 2018. Journal of Fish Biology, Popper Arthur N. and Hawkins, Anthony D., "An overview of fish bioacoustics and the impacts of anthropogenic sounds on fishes," 12 March 2019. Mongabay, Alberts, Elizabeth Claire, "For marine life, human noise pollution brings 'death by a thousand cuts'," 9 February 2021. Discover Magazine, Hellweg, Max Aguilera and McCarthy, Susan, "Killing Whales with Sound," 1 April 2002. BOEM, pp. 3.7-35, 3.7-36 moderate impacts on marine mammals Brattle Group, Pfeifenberger, Johannes, Newell, Sam, Graf, Walter and Spokas, Kasparov, "Offshore Wind Transmission: an analysis of planning in New England and New York," 23 October 2020. BOEM, p. E-30 Offshore transmission cables construction and maintenance Integral Consulting, Preziosi, Damian, "EMF Risks from Offshore Wind: A Complete Understanding," 6 September 2022	Thank you for your comment.

O.5.28 NEPA / Public Involvement Process

Table O.5-28: Responses to Comments on NEPA / Public Involvement Process

Comment Number	Comment	Response
0023-02	The project description included in the COP differs substantially from the plan described in the Environmental Notification Form (ENF) the developer submitted to the Massachusetts Environmental Protection Act (MEPA). We believe permitting documents, especially of such large and impactful projects, should be scrupulously consistent across all levels of government and unassailably accurate in their representations...The COP describes variants to the preferred landing sites in six scenarios, including the "South Coast Variant" (SCV), while the ENF describes eight (8) alternative landing sites, all of which are located in and under the jurisdiction of the Town of Barnstable. The COP describes a detailed plan to advance cables from the landward splicing vaults via a tunnel under East Bay, while the ENF focuses primarily on a preferred plan to advance cables by trenching the narrow .2 mile long causeway used to access the beach. The COP provides detailed information on the use of Wianno area for one of more cable landings, while the ENF discounts this possibility as impractical. We ask BOEM how the Draft EIS can evaluate the environmental impact of a years-long coastal zone construction project that presents such inconsistent information to federal and state permitting authorities	The applicant submitted a phased COP to BOEM on July 2, 2020, proposing the construction, operations, and decommissioning of offshore wind energy facilities for the proposed Project. A comprehensive update of the COP was submitted in December 2021, and subsequent updates were submitted in April, May, June, August, September, and November 2022. This Final EIS will inform BOEM's decision in the COP approval process. If its COP is approved, the applicant plans to begin construction in 2024. The purpose of BOEM's action is to determine whether to approve, approve with modifications, or disapprove the COP for the proposed Project. This purpose reflects BOEM's authority under the Outer Continental Shelf Lands Act (OCSLA) to authorize renewable energy activities on the OCS, as well as EO 14008; the shared goals of the Departments of Interior (DOI), Energy (DOE), and Commerce (DOC) to deploy 30 gigawatts (GW) of offshore wind energy capacity in the United States by 2030 while protecting biodiversity and promoting ocean co-use (White House 2021); and consideration of the goals of the applicant. BOEM will make this determination after weighing the factors in Subsection 8(p)(4) of the OCSLA that are applicable to plan decisions and considering the above goals.
0023-03	BOEM allowed a heavily redacted COP to form the basis for the Draft EIS, thereby precluding the opportunity for a full understanding of the project's environmental impact. This shielding of corporate information in this case is not in the public interest and results in a distinct disadvantage to those who oppose projects on the bases of environmental, conservation, and societal concerns...The fact that even the Executive Summary is completely hidden begs the question as to what information the developer has asked to keep from public scrutiny. Why should the public be prevented from knowing the developer's "Protected Species Mitigation Protocol" (section 1.2.8)? We are likewise prevented from reading the proponent's "Shallow Hazards Assessment" (section 3.1) and ask how this information can possibly be deemed proprietary, considering the purpose of the Draft EIS to respond, publicly, to the possible and probable environmental impacts of the proposed project to the OCS, Nantucket Sound, and the coastal zone environment.	"Portions of the COP have been redacted due to confidentiality and proprietary information. The Final EIS full addresses and analyzes all potential social and environmental impacts that may result from the proposed Project.

Comment Number	Comment	Response
0025-04	New England Wind was sited after a lengthy stakeholder and community engagement processes with the federal government which included representation from across Martha's Vineyard. AVANGRID has been an accessible, transparent, and responsive community partner throughout its ongoing development and permitting.	Thank you for your comment.
0029-06	Protecting Dowses Beach aligns with President Biden's call that "(t)he Federal Government must protect America's natural treasures." He continues: "Coastal communities have an essential role to play in mitigating climate change and strengthening resilience by protecting and restoring coastal ecosystems, such as wetlands, seagrasses...oyster reefs...to protect vulnerable coastlines, sequester carbon, and support biodiversity and fisheries."	Thank you for your comment.
0031-02	BOEM needs to seriously consider this environment-friendly, more cost effective, and intelligent planned/open access approach. This will take cooperation among OSW developers but BOEM's federal mandate is Ocean Energy Management. This means that BOEM has a leadership responsibility role and not simply accept whatever OSW developers place in front of it. BOEM must encourage and compel various separate OSW entities with their separate business interests to come together for the common good of the ocean and the environment. Destroying the ocean and industrializing it to depletion and death is wrong. BOEM must lead and not simply take the easiest way to getting an OSW project off the ground, especially when it has foreknowledge that the planned approach is the better way. As President Biden states: "we must combat the climate crisis with bold, progressive action that combines the full capacity of the Federal Government with efforts from every corner of our Nation, every level of government, and every sector of our economy." BOEM must be the leader in using the planned approach for the good of the United States.	Section 2.2 of the Draft EIS described those alternatives considered by not analyzed in detail. Developing a shared export cable corridor would not be technically or economically practicable because each other offshore wind project has distinct interconnection points to the electric power grid.
0040-04	Please consider a significant pause in this project to reevaluate local input, analysis, and sentiment....	Thank you for your comment.
0041-01	I have submitted many written comments over the years, attended many public hearings and provided public testimony. During all of which I, and many others, have stressed the need for proper baseline studies to be carried out prior to construction. This has not happened. We have also advocated for cumulative impacts to be analyzed; this has not happened. There is such a push for offshore wind construction to begin that we have forgone these extremely important steps that are necessary in helping us in determining the impacts construction and operation will have on the different species, the ecosystem, oceanographic processes, and the fishing industry.	This Final Environmental Impact Statement (EIS) assesses the potential environmental, social, economic, historic, and cultural impacts that could result from the construction and installation (construction), operations and maintenance (operations), and conceptual decommissioning of the New England Wind Project (Project). The applicant submitted a phased COP to BOEM on July 2, 2020, proposing the construction, operations, and decommissioning of offshore wind energy facilities for the proposed Project. A comprehensive update of the COP was submitted in December 2021, and subsequent updates were submitted in April, May, June, August, September, and November 2022. BOEM's role is to evaluate the potential effects of the proposed Project

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		as outlined in the COP as well as the impacts of a range of reasonable alternatives as required by NEPA. This Final EIS will inform BOEM's decision in the COP approval process. If its COP is approved, the applicant plans to begin construction in 2024. The purpose of BOEM's action is to determine whether to approve, approve with modifications, or disapprove the COP for the proposed Project.
0048-01	The redactions in these reports are concerning. They could very well relate to and shed light on the real environmental issues and potential harm this project could bring to Dowses Beach and the community of Barnstable. This information needs to be disclosed to the public before moving forward.	Portions of the COP have been redacted due to confidentiality and proprietary information. The Final EIS full addresses and analyzes all potential social and environmental impacts that may result from the proposed Project.
0048-02	The June 2022 COP submitted by Avangrid to BOEM differs significantly from their ENF. I ask that BOEM and other parties require an independent analysis and note the differences and inconsistencies between these documents. If BOEM is relying on a flawed COP, it should pause their process.	The applicant submitted a phased COP to BOEM on July 2, 2020, proposing the construction, operations, and decommissioning of offshore wind energy facilities for the proposed Project. A comprehensive update of the COP was submitted in December 2021, and subsequent updates were submitted in April, May, June, August, September, and November 2022. This Final EIS will inform BOEM's decision in the COP approval process. If its COP is approved, the applicant plans to begin construction in 2024. The purpose of BOEM's action is to determine whether to approve, approve with modifications, or disapprove the COP for the proposed Project. This purpose reflects BOEM's authority under the Outer Continental Shelf Lands Act (OCSLA) to authorize renewable energy activities on the OCS, as well as EO 14008; the shared goals of the Departments of Interior (DOI), Energy (DOE), and Commerce (DOC) to deploy 30 gigawatts (GW) of offshore wind energy capacity in the United States by 2030 while protecting biodiversity and promoting ocean co-use (White House 2021); and consideration of the goals of the applicant. BOEM will make this determination after weighing the factors in Subsection 8(p)(4) of the OCSLA that are applicable to plan decisions and considering the above goals.
0055-07	The Draft EIS provides far more detail about No Action and Phase 1 as compared to Phase 2. If BOEM intends to use the Final EIS for its stated purpose (project evaluation), Phase 2 must receive full treatment of the alternatives description and impacts analysis.	Phase 1 and Phase 2 of the Project are discussed in each resource section of Chapter 3. Where they exist, the differences between the Phases are called out and differing impacts are discussed. Overall, activities associated with Phase 1 and Phase 2 are similar in nature and addressed accordingly in the Final EIS.
0055-13	This Final EIS, and all future NEPA documents for other wind projects, should clearly specify if an impact is adverse or beneficial. The Draft EIS indicates that impacts are adverse unless specified as beneficial. However, some impact producing factors (e.g., presence of structures) are expected to have both adverse and beneficial impacts (e.g., adverse for soft bottom species and beneficial for structure oriented species). The clarity of these descriptions would be improved if "adverse" or	If an impact is deemed beneficial, it is noted in the Final EIS. Section 3.3 of the EIS provides the definition of impact levels used throughout the EIS.

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	"beneficial" were specified for each impact, or, at a minimum, at the beginning of each section. This should be done consistently throughout all sections of the document.	
0055-20	In terms of cumulative effects, the Draft EIS considers future offshore wind energy activities in other lease areas as part of future baseline conditions against which the impacts of this project are compared (Appendix 3, Table E3-1). As we understand it, the Draft EIS has two baseline conditions, one with other wind projects and one without. Under the No Action alternative, the language indicates that the baseline condition assumes "the continuation of all other existing and reasonably foreseeable future activities...without the Proposed Action" (page ES-11). The alternatives should be compared against both sets of conditions in a consistent way.	The No Action Alternative consists of the current baseline conditions as influenced by past and ongoing activities and trends and serves as the baseline against which all action alternatives are evaluated. The Draft EIS presented a complete description and analysis of impacts from ongoing activities and trends (i.e., No Action Alternative) and impacts from the Proposed Action and action alternatives. The No Action Alternative provides a current baseline for analysis of impacts from the action alternatives. A separate analysis of the No Action Alternative when combined with future planned activities (i.e., cumulative actions) provides the future baseline as a basis for comparison of the cumulative impacts of the action alternatives.
0055-29	Given the current pace of offshore wind energy development in this region and workload constraints, we are unable to provide a detailed review of this project and the Draft EIS. For example, this comment period overlaps with comment periods on Draft EIS documents for three other wind projects in our region, BOEM's Renewable Energy Modernization Rule, and the Coast Guard's Port Access Route Study for Approaches to Maine, New Hampshire, and Massachusetts.	Thank you for your comment.
0055-32	We recommend including more detailed table captions and column headers for tables and recommend including cross references to tables in the corresponding text.	Thank you for your comment.
0056-01	The aggressive timeline for offshore wind development in the Atlantic poses challenges for multiple industries and multiple jurisdictions. It is imperative that BOEM takes a holistic approach to the combined development of projects.	BOEM, in its role as NEPA lead agency, circulated the Draft EIS consistent with the CEQ's NEPA Implementing Regulations, which state that "agencies shall allow at least 45 days for comments on draft statements" (40 CFR 1506.11). The Draft EIS was originally made available for review and comment for 45 days. The efficiency of the NEPA process is dependent on completing the analysis and making the document available to the public in a timely manner. As described in the NEPA regulations, an agency should commence preparation of an EIS as close as practicable to the time the agency received a proposal so that the Final EIS can contribute to the decision-making process (40 CFR 1502.5).
0056-08	We continually stress that it is imperative to have a process where all voices are heard so that we shall have the most responsible development of this new industry and minimizing adverse impacts to commercial fishing.	Thank you for your comment.

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0070-06	The Final EIS should include information about stakeholder engagement and consultation with environmental justice populations and Native American Tribes. Several of the ports under development and planned as 4 critical staging areas for offshore wind projects are considered environmental justice communities. The Final EIS should include steps that are being taken to ensure these and other environmental justice communities are seeing economic benefits. In addition, long-term planning is necessary to ensure that the economic gains in these communities during offshore wind development are long-lasting. For this to happen effectively, developers and federal, state, and local entities must consult these communities at every step of the planning process. BOEM should ensure that all stakeholder engagement processes are conducted with appropriate language access.	Appendix J of the Final EIS includes Section 106 consultations and stakeholder engagement activities.
0073-06	Another concern has been the lack of transparency between Avangrid and the Town of Barnstable. Although talks between these two parties began 2 years ago, the information regarding Dowses did not “hit the street", literally, until September/October 2022 when a few yard signs randomly dispersed informed whoever drove by. A November meeting at the Library was the first time that SOME of the taxpayers were introduced to the plan…with a hint that the project was “A DONE DEAL” The Town, who can certainly mail out Tax Bills 4X’s a year could have tucked this important info into one of these mailings prior to the Fall 2022 “word of mouth” campaign.	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0076-01	BOEM is fully aware of the dates of the Fishery Management Council meetings, as it attends many of them, including those which occurred during the New England Wind comment period. Meeting fatigue, combined with the fact that there are only so many hours in a day to attempt to read through the thousands of pages of BOEM Draft EISs and associated documents makes full comments on each Draft EIS impossible. As the public stakeholders with the most to lose from offshore wind, we request that BOEM extend the public comment period for New England Wind and well as all the other proposed Project Draft EISs to allow for true public participation in the BOEM process.	BOEM, in its role as NEPA lead agency, circulated the Draft EIS consistent with the CEQ’s NEPA Implementing Regulations, which state that “agencies shall allow at least 45 days for comments on draft statements” (40 CFR 1506.11). The Draft EIS was originally made available for review and comment for 45 days. The time provided was a total of 45 days and was sufficient for the public to review and provide comments on the Draft EIS. The efficiency of the NEPA process is dependent on completing the analysis and making the document available to the public in a timely manner. As described in the NEPA regulations, an agency should commence preparation of an EIS as close as practicable to the time the agency received a proposal so that the Final EIS can contribute to the decision-making process (40 CFR 1502.5).
0076-02	BOEM continues to conflate the No Action Alternative with a Cumulative Impacts Analysis...The No Action Alternative defines "other reasonably foreseeable future impact-producing offshore wind and non-offshore wind activities" as No Action. This is not a No Action	The No Action Alternative consists of the current baseline conditions as influenced by past and ongoing activities and trends and serves as the baseline against which all action alternatives are evaluated. The Draft EIS presented a complete description and analysis of impacts from

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	Alternative. This is a Cumulative Impacts Alternative. This makes comparison of No Action with the Cumulative Impacts Analysis impossible as a practical matter, and the document does not contain any charts, tables, or methodology by which a standalone Cumulative Impacts Analysis was conducted... A true No Action Alternative would contain only existing permitted projects- Vineyard Wind 1 and South Fork Wind Farm- in its analysis. A Cumulative Impacts Alternative would detail all the planned and future foreseeable BOEM actions such as those potential future projects detailed in Appendix E. By equating the two, BOEM serves to downgrade the impacts produced by the proposed Project of New England Wind. This is corruption of NEPA and must be rewritten and all alternatives re-analyzed, with standalone No Action and Cumulative Impacts Alternatives.	ongoing activities and trends (i.e., No Action Alternative) and impacts from the Proposed Action and action alternatives. The No Action Alternative provides a current baseline for analysis of impacts from the action alternatives. A separate analysis of the No Action Alternative when combined with future planned activities (i.e., cumulative actions) provides the future baseline as a basis for comparison of the cumulative impacts of the action alternatives.
0076-02	Much of the Draft EIS documents seem to be taken from the COP and only utilize developer generated analysis, rather than incorporating analysis conducted by independent entities. We therefore request that BOEM describe in detail how it conducts Draft EIS analysis, who conducts the Draft EIS drafting whether BOEM or a third party contractor, if engaging a third party contractor how and with whom that engagement is conducted, what expertise in each field of particularly navigation/maritime safety/fisheries science/fisheries economic analysis/radar/marine mammal science is possessed by the entities and individuals conducting the review by the entity preparing the Draft EIS, what documents are primarily utilized in Draft EIS development/analysis, and how BOEM arrives at its impact conclusions.	Consistent with BOEM's guidance on preparing third-party NEPA documents, information from the COP is included pursuant to independent verification. All conclusions of the Final EIS are based on independent analysis.
0076-03	We have noticed that not all Draft EIS documents are uniform in layout. Newer Draft EIS documents in fact seem to be shorter and less detailed than previous Draft EIS documents that we have reviewed. This is concerning given the scope and pace by which BOEM is moving offshore wind development in our region.	BOEM has worked diligently to provide as much information as is possible, under current regulatory guidance, for all offshore wind EIS documents. Where applicable, additional information has been provided in the appendices. One such example is Appendix G, IPF Tables Assessment of Resource with Minor (or Lower) Impacts; to focus on the impacts of most concern in the main body of the EIS, BOEM included the analysis of resources within an appendix.
0076-04	As financial troubles with the New England Wind project have resulted in the developer claiming that current power purchase agreements are infeasible, as recently as a month ago and after the Draft EIS was released, BOEM can no longer rely on economic "feasibility" as a measure for approving or disapproving Alternatives or for rejecting Alternatives for analysis, unless by that same reasoning it is prepared to disapprove the entire project. We request that BOEM remove all "feasibility" rationale from the Draft EIS review, as well as conduct a supplemental EIS to analyze the Alternatives Considered but Not Analyzed in Detail which were previously rejected for not meeting	The Department of the Interior's NEPA regulations, at 43 CFR 46.420(b), state that the term "reasonable alternatives" includes alternatives that "are technically and economically practical or feasible and meet the purpose and need of the proposed action." It is therefore appropriate to consider "feasibility" when developing alternatives. BOEM's NEPA analysis is based on the proposal currently submitted for its consideration. That proposal is based on a PPA currently in effect and BOEM considers economic feasibility based on those facts, regardless of whether the economic terms of the PPA are eventually revised.

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	BOEM "feasibility" or developer power purchase contractual obligations. Or, in the converse, we request that BOEM use its own "feasibility" standard to reject the proposed Project entirely.	
0076-05	The [BOEM NEPA] documents lack a standalone and/or detailed cumulative impacts analysis. Impacts are generalized, very rarely quantified, and those that are quantified are quantified in a general and not specific manner. This makes detailed and specific comment, or weighing of alternatives, impossible.	Appendix E of the Draft EIS stated that 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]). This appendix discussed 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).
0076-07	The various changes that this lease has undergone have not been clearly articulated by BOEM, and also in general make the projects hard to follow. BOEM needs to do a better job of terminology, clear cut project delineation, and chart depiction of leases and projects, as the developers continue to change names/lease assignments/ownership at a rapid pace and this makes public participation even more difficult when delineations are muddied. Please clarify the lease assignments, ownership, and projects, analyzing each project individually and by name on all BOEM documents and websites.	Thank you for your comment.
0079-01	AVANGRID has worked extensively , both on the South Coast of Massachusetts as well as the North Shore to ensure local involvement in the planning and development process through federal, state, regional, and local permitting and public events. Avingrid has conducted significant and sustained outreach, seeking input and active participation from local residents, elected and appointed officials, local tribes, fishing and marine interests, environmental advocacy groups, and other relevant stakeholder groups.	Thank you for your comment.
0081-01	The EPA's National Environmental Policy Act (NEPA) describes public participation, including subsection (a)(5) which highlights the need to "ensure meaningful public participation throughout the NEPA process." We question how meaningful input is possible given that BOEM currently has three Draft EISs in the Atlantic which have public comment deadlines between February 14th and February 21st...As	BOEM, in its role as NEPA lead agency, circulated the Draft EIS consistent with the CEQ’s NEPA Implementing Regulations, which state that “agencies shall allow at least 45 days for comments on draft statements” (40 CFR 1506.11). The Draft EIS was originally made available for review and comment for 45 days. The time provided was a total of 45 days and was sufficient for the public to review and provide

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	RODA and our members have stated numerous times before, the fishing industry is not constrained to one region and often operates coastwide. Thus activities throughout the Atlantic will have impacts to fisheries, marine protected species, and coastal communities in geographically distinct regions.	comments on the Draft EIS. The efficiency of the NEPA process is dependent on completing the analysis and making the document available to the public in a timely manner. As described in the NEPA regulations, an agency should commence preparation of an EIS as close as practicable to the time the agency received a proposal so that the Final EIS can contribute to the decision-making process (40 CFR 1502.5).
0081-02	For some identifiable impacts, there remains serious concerns about the scale and severity of those impacts. RODA and others have long called for a Programmatic Environmental Impact Statement (PEIS) with an adaptive management approach. RODA is reiterating that recommendation with the additional reason of ensuring the required meaningful public participation.	BOEM's renewable energy program occurs in four distinct phases: (1) planning and analysis, (2) lease issuance, (3) site assessment, and (4) construction and operations with defined decision points that require a NEPA review. BOEM's regulations require BOEM to review New England Wind's submitted COP and prepare an appropriate NEPA analysis. BOEM evaluates considerations such as the number of lease sales expected in each area, as well as where BOEM is in the overall leasing process, for determining whether a programmatic EIS is appropriate for a regional area.
0081-04	Politics must not interfere with scientific integrity or transparency and we request BOEM clarify what document the public should review to understand the cumulative impacts of potentially 3,000 turbines whose installation it is "streamlining" into the seabed between MA and VA alone. We further request BOEM to provide explicit information as to how it will approach cumulative impacts reviews for this and future projects.	The No Action Alternative consists of the current baseline conditions as influenced by past and ongoing activities and trends and serves as the baseline against which all action alternatives are evaluated. The EIS also separately analyzes the continuation of all other existing and reasonably foreseeable future activities. The Cumulative impacts analysis includes these past and ongoing activities, plus the proposed Project and environmental trends.
0081-05	There appears to be no standard protocol for when BOEM will conduct a project's EIS, and inconsistency is increased when analyses are conducted piecemeal for each phase versus across an entire lease area or geographic region. As the PPAs have, in the past, determined BOEM's range of alternatives and what fisheries mitigation measures can be considered within the project parameters, this leads to significant uncertainty regarding how BOEM will conduct the upcoming NEPA reviews. Moreover, the current approach makes it nearly impossible to conduct any cumulative analysis as there is no appropriate time in the federal process to do so.	"BOEM, in its role as NEPA lead agency, circulated the Draft EIS consistent with the CEQ's NEPA Implementing Regulations, which state that "agencies shall allow at least 45 days for comments on draft statements" (40 CFR 1506.11). The Draft EIS was originally made available for review and comment for 45 days. The time provided was a total of 45 days and was sufficient for the public to review and provide comments on the Draft EIS. The efficiency of the NEPA process is dependent on completing the analysis and making the document available to the public in a timely manner. As described in the NEPA regulations, an agency should commence preparation of an EIS as close as practicable to the time the agency received a proposal so that the Final EIS can contribute to the decision-making process (40 CFR 1502.5)."
0081-06	Since the Notice of Intents to prepare the Draft EIS, BOEM has taken action on many other relevant activities in the region. There have been multiple Draft EISs, a regional USCG Port Access Route Study, an auction for six additional leases in the New York Bight, publication of several more Draft WEAs (Central Atlantic WEAs), and identification of Draft Call Areas in the Gulf of Maine... Yet, BOEM has not sufficiently evaluated the cumulative impacts of prospective activity in the region.	The No Action Alternative consists of the current baseline conditions as influenced by past and ongoing activities and trends and serves as the baseline against which all action alternatives are evaluated. The EIS also separately analyzes the continuation of all other existing and reasonably foreseeable future activities. The Cumulative impacts analysis includes these past and ongoing activities, plus the proposed Project and environmental trends.

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	This must be remedied immediately and should be incorporated into all future analyses conducted by BOEM.	
0081-07	RODA strongly urges BOEM to reconsider the sequencing of the site assessment, COP approval, and NEPA initiation for OSW projects, as the current rushed timeline has resulted in Proposed Alternatives that may not be possible given technical constraints. If the site assessment is fully complete prior to the COP approval and initiation of the NEPA analyses, the Proposed Action would be better informed. A compression of these different analyses and permitting actions means the public is not adequately informed of the expected project design and again demonstrates why alternatives should be fully analyzed and compared against each other - not solely to the Proposed Action. We strongly urge BOEM to require geological information, which may drastically change a project design in light of fisheries impacts, be more readily available early on in the process.	BOEM's current renewable energy program occurs in four distinct phases: (1) planning and analysis, (2) lease issuance, (3) site assessment, and (4) construction and operations with defined decision points that require a NEPA review.
0081-11	Since the scoping period for the Draft EIS BOEM issued a new policy that has the effect of excluding alternatives from environmental review that would in fact reduce or mitigate fisheries impacts. The "Process for Identifying Alternatives for Environmental Reviews of Offshore Wind Construction and Operations Plans pursuant to the NEPA" released in June 2022 standardizes the alternatives BOEM will consider during the NEPA process and clarifies BOEM's policy of considering only a narrow range of alternatives consistent with a developer's preferred project plans. RODA urges BOEM to reconsider this policy. Specifically, for these projects and all other proposed OSW projects, the agency should include alternatives for analysis in each of its environmental review documents describing specific fisheries mitigation solutions and afford these full, neutral consideration.	Thank you for your comment.
0081-18	The alternatives listed in the Draft EIS are not mutually exclusive. BOEM may "mix and match" multiple listed Draft EIS alternatives to result in a preferred alternative that will be identified in the Final EIS provided that: (1) the design parameters are compatible; and (2) and the preferred alternative still meets the purpose and need." This is concerning in the sense that the public cannot effectively understand what is the preferred alternative. It is setting up an opportunity for a bait-and-switch when the preferred alternative will not be revealed until the publication of the Final EIS. Principles of transparency and informed decision-making should never be undermined and the public should be fully informed throughout the process.	Section 2 of the Draft EIS noted that the alternatives listed in Table 2.1-1 are not mutually exclusive. BOEM may select elements of multiple listed Draft EIS alternatives resulting in a preferred alternative identified in the Final EIS provided that the design parameters are compatible and the preferred alternative still meets the purpose and need. The Final EIS has been updated to identify the preferred alternative.
0081-29	BOEM's draft guidance for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf was woefully inadequate in its approach to fisheries compensation.	Thank you for your comment.

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0081-33	BOEM has yet to include a clear decommissioning plan in any of their Draft EISs to date. While it is BOEM's mandate to remove all foundations from 15 feet below the mudline, there is no clear designation of how harm will be quantified and what analyses will be conducted. We strongly encourage BOEM to not be over reliant on "conceptual" decommissioning and require developers to include a full decommissioning plan.	Decommissioning plans and timelines were discussed in Section 2 of the Draft EIS. The decommissioning approach is unchanged from the Draft EIS; therefore, no changes to the Final EIS were necessary. Further, additional NEPA analysis will be conducted prior to making a determination on the decommissioning application that needs to be submitted for purposes of authorizing decommissioning activities, including the methods to be used.
0081-34	Impact analyses for O&M are based upon a 35-year operational term. Yet, it is anticipated that some projects may last longer. If it is anticipated that installation will remain longer, or even permanent, analyses in the EIS must reflect these longer time periods. This is noteworthy for other ocean users, such as the fishing industry, who may be anticipating the re-opening of certain areas to fishing for future generations.	Decommissioning plans and timelines were discussed in Section 2 of the Draft EIS. The decommissioning approach is unchanged from the Draft EIS; therefore, no changes to the Final EIS were necessary. Further, additional NEPA analysis will be conducted prior to making a determination on the decommissioning application that needs to be submitted for purposes of authorizing decommissioning activities, including the methods to be used.
0082-02	Avangrid has publicly stated to both its investors and to the public that the New England Wind Project is no longer economically viable under the Power Purchase Agreements it negotiated with electric distribution companies (EDCs) in CT for Park City Wind and in MA for Commonwealth Wind. It has been well covered in the media, that on December 30, 2022 the MA EDCs and the MA DPU rejected Avangrid's request to renegotiate the PPAs for Commonwealth Wind. Avangrid is now pursuing legal action to overturn that ruling by the DPU. Additionally, we were recently in touch directly with the CT DEEP officials and were told that the CT EDCs do not have any plans or processes underway to review the PPAs for Park City Wind. If the BOEM does not reject the Project for the reason cited in Comment 1 or for any other reason(s), then, given the fact that: 1) Avangrid has stated the New England Wind Project is not economically viable without renegotiation of the PPAs for both Park City Wind (Phase 1) and Commonwealth Wind (Phase 2), and 2) neither the MA nor the CT EDCs have any plans to renegotiate the PPAs, we request the BOEM suspend any further action (and use of its taxpayer funded resources) on its review of the Draft EIS until such time Avangrid can demonstrate with reasonable certainty the economic viability of this project.	The Department of the Interior's NEPA regulations, at 43 CFR 46.420(b), state that the term "reasonable alternatives" includes alternatives that ""are technically and economically practical or feasible and meet the purpose and need of the proposed action." It is therefore appropriate to consider "feasibility" when developing alternatives. BOEM's NEPA analysis is based on the proposal currently submitted for its consideration. That proposal is based on a PPA currently in effect and BOEM considers economic feasibility based on those facts, regardless of whether the economic terms of the PPA are eventually revised.
0083-10	The Regional Wildlife Science Collaborative for Offshore Wind (RWSC) is a multi-sector collective created and defined by federal agencies, states, conservation organizations, and offshore wind developers to "collaboratively and effectively conduct and coordinate relevant, credible, and efficient regional monitoring and research of wildlife and marine ecosystems that supports the advancement of environmentally responsible and cost-efficient offshore wind power development activities in U.S. Atlantic waters." We urge BOEM to	Thank you for your comment.

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	continue to participate in and fund RWSC to support its science plan development and to implement the monitoring and research activities identified in the science plan. BOEM, through RWSC and individually, must also continue to collaborate with state efforts... scientists, NGOs, the wind industry, and other stakeholders to use information from monitoring and other research, and evolving practices and technology, to inform cumulative impact analyses moving forward.	
0085-01	We do not believe that comment periods offered by BOEM for any of the various offshore wind lease areas has given the commercial fishing industry adequate time to keep up with BOEM's new "fast and furious" approach to mainline the offshore leasing and approval process and prepare and comment effectively.	BOEM, in its role as NEPA lead agency, circulated the Draft EIS consistent with the CEQ's NEPA Implementing Regulations, which state that "agencies shall allow at least 45 days for comments on draft statements" (40 CFR 1506.11). The Draft EIS was originally made available for review and comment for 45 days. The time provided was a total of 45 days and was sufficient for the public to review and provide comments on the Draft EIS. The efficiency of the NEPA process is dependent on completing the analysis and making the document available to the public in a timely manner. As described in the NEPA regulations, an agency should commence preparation of an EIS as close as practicable to the time the agency received a proposal so that the Final EIS can contribute to the decision-making process (40 CFR 1502.5). "
0086-08	Avangrid has publicly stated that it cannot afford to build the CW project and its parent Iberdrola plans to divest its OSW stake in the USA.	The Department of the Interior's NEPA regulations, at 43 CFR 46.420(b), state that the term "reasonable alternatives" includes alternatives that ""are technically and economically practical or feasible and meet the purpose and need of the proposed action." It is therefore appropriate to consider "feasibility" when developing alternatives. BOEM's NEPA analysis is based on the proposal currently submitted for its consideration. That proposal is based on a PPA currently in effect and BOEM considers economic feasibility based on those facts, regardless of whether the economic terms of the PPA are eventually revised.
0095-3-01	The table of contents for [Construction and Operations Plan] Volume 2 indicates that all the information not shared includes matters of interest to the public regarding environmental impact, I think. Question, first, why the heavy redaction? And second, when will the full scope of Volume 2 be available to the public? Our group is primarily interested, solely interested in preventing the use of Dowses Beach to land these electrical export cables. Why does the inset in figure 5.2-7 show the near shore proposed cable route and show the area directly in front of Dowses as complex habitat, while the inset eliminates Dowses from the map, showing beaches further to the east instead? Second, does the complex habitat indicated in figure 5 dot 2 dash 7 include the area recognized as a possible eel grass bed at Dowses Beach?	Portions of the COP have been redacted due to confidentiality and proprietary information. The Final EIS full addresses and analyzes all potential social and environmental impacts that may result from the proposed Project.

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0096-1-02	we ask BOEM to consider a 15-day extension of the public comment time period on this matter given the complexities of both the COP and the Draft EIS, as well as ongoing uncertainties related to Commonwealth Wind or Phase 2's financial viability. Such an extension would provide clarity as well as improved public input	On December 23, 2022, BOEM issued a Notice of Availability (NOA) for the Draft EIS. The Draft EIS was made available in electronic format for public viewing at https://www.boem.gov/renewable-energy/state-activities/new-england-wind-formerly-vineyard-wind-south. The NOA commenced the 60-day public review and comment period of the Draft EIS. BOEM held three virtual public hearings to solicit feedback and identify issues for consideration in preparing this Final EIS. Throughout the public review and comment period, government agencies, members of the public, and interested stakeholders had the opportunity to provide comments on the Draft EIS in various ways.
0097-2-02	The developer should never have been allowed to keep results of their environmental studies hidden from the public by declaring what they learned proprietary, resulting in an unacceptable level of redaction in Volume 2 of the COP.	Portions of the COP have been redacted due to confidentiality and proprietary information. The Final EIS full addresses and analyzes all potential social and environmental impacts that may result from the proposed Project.
0097-2-03	we feel this proposal should never have been allowed inclusion on the so called Fast 41 Regulatory Approval Tract, despite the current administration's objectives	Thank you for your comment.

O.5.29 Health and Safety

Table O.5-29: Responses to Comments on Health and Safety

Comment Number	Comment	Response
0023-10	The developer proposes to insert an unprecedented amount of electrical ocean wind farm power, 1,200 megawatts, into the waters and under the sand where many people, including small children, swim, relax, and play from May through September. This very fact has led to significant concern in the 5 community regarding the possible health and safety impacts on humans. The literature on EMF's may be inconclusive, but inconclusive it is, with no guarantee that deleterious effects do not exist. The developer has dismissed such community worries by saying cables from the mainland in nearby Hyannis already carry electrical power to the island of Nantucket. We note for BOEM that the two cables to Nantucket carry a total of 71 Megawatts. In addition to EMFs, heat from the cables is an issue of great concern. The planned vaults under the parking lot would not be protected from very high heat build-up during the summer months, or coastal flooding at any time of year, raising fire safety and emergency response concerns.	The best available science was used to evaluate potential impacts from EMF and adequate cable burial depths. BOEM, the U.S. Department of Energy, and the U.S. Department of the Interior have performed several studies which have contributed to the impact determination in the EIS. These studies suggest that a 6 ft burial depth would have the least impact and reduce magnetic field signatures at the seafloor approximately four-fold. More information on potential impacts from EMF can be found in Sections 3.4.2.1 and 3.4.2.3 of the Final EIS.
0023-11	We ask BOEM to imagine a scenario requiring such response in a full parking lot during a summer day, with hundreds of beachgoers, including small children, present. The parking lot of a bathing beach with one narrow means of egress is simply not appropriate for such a large installation of electrical infrastructure, no matter how laudable and renewable the means of energy generation.	Section 2 of the Draft EIS stated that the Phase 2 offshore export cables would make landfall within paved parking areas at either the Dowses Beach Landfall Site or the Wianno Avenue Landfall Site in the Town of Barnstable (Figure 2.1-8). The ocean-to-land transition at the Dowses Beach Landfall Site would employ the HDD technique, which would avoid or minimize impacts on the beach, intertidal zone, and nearshore areas. The applicant's onshore construction schedule minimizes impacts to land uses to the greatest extent practicable limiting onshore construction activities during peak summer months and other times when demands on these resources are elevated. All disturbed areas at the landfall sites or other areas disturbed during installation of the onshore export cables and grid interconnection cables will be restored upon completion of construction.
0035-03	[opposition to Dowses Beach landing site due to] the potential danger to swimmers due to electrical transmission in water if the lines are damaged or degraded over time	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using

Comment Number	Comment	Response
		horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0038-03	My kids have had numerous field trips to Dowses for years. I certainly wouldn't want ones dear to my heart playing and enjoying the beach with 1200 megawatts of energy under them. Sorry to say but it is a recipe for disaster if this happens.	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0039-01	I am strongly opposed to the "Phase 2" onshore electrical cable landings at Dowses Beach. The excessive 1,200 megawatts of electricity...will be a danger to our wildlife and our children!...risking the health of my family	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0042-01	addition to the fragile nature of an estuary environment and the wildlife habitat which Dowses Beach provides, the most important issue for me is the large-scale 1200 MW of electrical energy that will be landed on a beach where my 6 grandchildren play!	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.

Comment Number	Comment	Response
0043-01	We are extremely concerned that there is no proven presented Data on the health and safety risk of these high voltage cables to people, wildlife, and our aquifer.	Thank you for your comment.
0045-01	I am deeply upset over the lack of concern for our fragile community beach and the safety of our children. Electromagnetic fields from the transmission cables have proven to disrupt marine life as well as cause adverse health effects to those in close proximity.	The best available science was used to evaluate potential impacts from EMF and adequate cable burial depths. BOEM, the U.S. Department of Energy, and the U.S. Department of the Interior have performed several studies which have contributed to the impact determination in the EIS. These studies suggest that a 6 ft burial depth would have the least impact and reduce magnetic field signatures at the seafloor approximately four-fold. More information on potential impacts from EMF can be found in Sections 3.4.2.1 and 3.4.2.3 of the Final EIS.
0046-01	My wife and I are deeply concerned of the unproven safety of these Commercial high voltage cables and the electronic magnetic field to the health of our children, grandchildren and neighbors...There is proof that the electronical magnetic fields produced by these cables have been linked to childhood leukemia and brain cancer.	The best available science was used to evaluate potential impacts from EMF and adequate cable burial depths. BOEM, the U.S. Department of Energy, and the U.S. Department of the Interior have performed several studies which have contributed to the impact determination in the EIS. These studies suggest that a 6 ft burial depth would have the least impact and reduce magnetic field signatures at the seafloor approximately four-fold. More information on potential impacts from EMF can be found in Sections 3.4.2.1 and 3.4.2.3 of the Final EIS.
0046-12	Where is the evidence based testing and data on the commercial electrical cables proving that there is no health and safety risks especially when placed in the middle of a small residential village. None has been presented.	Thank you for your comment.
0047-04	the thought of running 1,200 megawatts of energy under the beach and causeway is disturbing -the heat, magnetic field, and health issues!!...hazardous effects have not been properly studied - why should we be part of the experiment.	Thank you for your comment.
0048-11	The Town of Barnstable already has an 800 MW submarine cable landing at Covell's beach (Vineyard Wind). This project is underway. It is not just or fair that this one town take on three landing sites at three residential beaches (totaling approximately 2800 MW of high voltage power at beaches in close proximity to one another, and three new huge substations in residential areas. Having this unprecedented amount of high amount of voltage running under our beaches, estuarian environments, residential roads, and causeway from which young children fish, and two fragile bays, needs further review. There have not been adequate studies of this much power running under areas where our children swim, walk and play.	As noted in COP Vol. I Section 4.3.1.8, the HDD trajectory (cable route nearshore) is estimated to be approximately 30 feet below ground surface at Mean High Water mark. At this depth, the EMF signature from the cable would be at very low to undetectable. No cables would be exposed to open water where recreational beaches exist and all electrical current would be confined to the offshore export cable. Analysis on impacts are addressed in Final EIS Sections 3.5.2.3 and 3.4.2.3
0049-02	the cables erode prompting block island to post signs on the beaches " beware of electrocution.	Thank you for your comment.

Comment Number	Comment	Response
0054-04	THERE HAVE BEEN NO STUDIES THAT WILL DETERMINE THE HARM THIS AMOUNT OF 1200 MEGAWATTS WILL DO TO PEOPLE AND WILDLIFE AND THIS COMPANY HAVE NEVER ATTEMPTEDSUCH A HUGE AND COMPLICATED PROJECT EVER BEFORE. THEREFORE, WE ARE THE COLLATERAL DAMAGE.GREATER DOWSES BEACH IS A GENERATIONALLY ICONIC PLACE FOR WILDLIFE AND PEOPLE AND IT IS NO PLACE TO BE USED FOR EXPERIMENTAL INDUSTRIAL PURPOSES.	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0055-12	Table ES-3 is very confusing. There are multiple impact determination rows for each resource and alternative. It appears that one row represents expected adverse impacts while the second row indicates expected beneficial impacts. This is not stated in the text, however. If this is true, we do not necessarily agree that every resource will experience both adverse and beneficial impacts from offshore wind development. Furthermore, the a and b alternative superscripts indicate planned activities without New England Wind project impacts and cumulative impacts with New England Wind project impacts, respectively. It is unclear if these superscripts correspond to the impact determination rows. Given Alternative C has two sub-alternatives, we recommend separating out these sub-alternatives in this summary table so stakeholders can compare impacts across alternatives. Also, the table text only specifies a beneficial impact; we recommend denoting adverse impacts as well.	Table ES-3 summarizes the impacts of each alternative and the cumulative impacts of each alternative. Chapter 3 of the Draft EIS resource sections included detailed analysis supporting these impact determinations.
0060-02	Avangrid plans to land cables of 1200mw energy into this parking lot. There has been ZERO research of the effects of such excessive energy upon this ecosystem	The best available science was used to evaluate potential impacts from EMF and adequate cable burial depths. BOEM, the U.S. Department of Energy, and the U.S. Department of the Interior have performed several studies which have contributed to the impact determination in the EIS. These studies suggest that a 6 ft burial depth would have the least impact and reduce magnetic field signatures at the seafloor approximately four-fold. More information on potential impacts from EMF can be found in Sections 3.4.2.1 and 3.4.2.3 of the Final EIS. More information on the heat produced by powered transmission cables can be found in Section 3.4.2.1 of the Final EIS.
0068-01	I am so so opposed to Avangrid's attempt to drill on Dowses Beach:*1,200,000 KW of electricity in OUR sand???? Are you kidding me? Our children and grand babies are currently enjoying that beach (as	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment.

Comment Number	Comment	Response
	have I since the early '60's) without FEAR.... *Avangrid's plan will be a constant worry of electricity in the sand plus EMFs	The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0068-04	The parking lot and beach which frequently floods..... what about the electricity coming through that?	Multiple cable landfall locations have been considered for each Phase of the Project to minimize disruption to residents and minimize impacts on the onshore environment. The Phase 2 offshore export cables will come ashore at the Dowses Beach Landfall Site in Barnstable, unless technical, logistical, grid interconnection, or other unforeseen issues arise that preclude the applicant from installing one or more Phase 2 offshore export cables within the OECC and a second grid interconnection point is needed (see Section 4.1.3.3 of COP Volume I in Appendix C). The ocean to land transition at the Dowses Beach Landfall Site will be made using horizontal directional drilling (HDD), which will avoid or minimize impacts to the beach, intertidal zone, and nearshore areas and achieve a burial significantly deeper than any expected erosion.
0081-13	The Summary and Comparison of Impacts Among Alternatives (Table ES-3) is unclear and confusing; each Impact rating for Alternatives B and C have multiple cells within a row, with no clear indication of what this means. Further, the grouping of C-1 and C-2, gives the public no ability to understand if one sub-alternative has less impact.	Table ES-3 summarizes the impacts of each alternative and the cumulative impacts of each alternative. Chapter 3 of the Draft EIS resource sections included detailed analysis supporting these impact determinations.
0083-41	The Draft EIS... does not analyze whether collocating the two cables [in either Alternative C1 or C-2] increases impacts from electromagnetic fields (EMF). While the Draft EIS states that developers typically allow at least 330 feet between cables, the Final EIS should explain whether the Vineyard Wind 1 OECC and New England Wind OECC will maintain this distance and analyze whether collocating the two cables in a single corridor would result in any increased EMF impacts.	The best available science was used to evaluate potential impacts from EMF and adequate cable burial depths. BOEM, the U.S. Department of Energy, and the U.S. Department of the Interior have performed several studies which have contributed to the impact determination in the EIS. These studies suggest that a 6 ft burial depth would have the least impact and reduce magnetic field signatures and all cables would be separated by a distance of 164 to 328 feet (COP Volume I, Section 2.3.1). More information on potential impacts from EMF can be found in Section 3.4.2.1 and 3.4.2.3 of the Final EIS.
0095-5-02	I'm also concerned about the impact of high energy cables underwater, as well as on land, and the impact of the natural environment, as well as the human environment.	Thank you for your comment.

Comment Number	Comment	Response
0095-5-06	I'm concerned about...the failure of the windmill production supply system. It's apparently now beginning to break down as a result of overload. I'm concerned that if we have inferior products going in on land, the effects on salt water is going to have even a more devastating impact on that. And I'm concerned about that and hopefully we have information that would suggest that that is not the case. But right now studies are showing, current studies, today studies are showing that these windmills are totally collapsing.	Thank you for your comment.

O.5.30 Other Comments

Table O.5-30: Responses to Other Comments

Comment Number	Comment	Response
0055-12	Table ES-3 is very confusing. There are multiple impact determination rows for each resource and alternative. It appears that one row represents expected adverse impacts while the second row indicates expected beneficial impacts. This is not stated in the text, however. If this is true, we do not necessarily agree that every resource will experience both adverse and beneficial impacts from offshore wind development. Furthermore, the a and b alternative superscripts indicate planned activities without New England Wind project impacts and cumulative impacts with New England Wind project impacts, respectively. It is unclear if these superscripts correspond to the impact determination rows. Given Alternative C has two sub-alternatives, we recommend separating out these sub-alternatives in this summary table so stakeholders can compare impacts across alternatives. Also, the table text only specifies a beneficial impact; we recommend denoting adverse impacts as well.	Table ES-3 summarizes the impacts of each alternative and the cumulative impacts of each alternative. Chapter 3 of the Draft EIS resource sections included detailed analysis supporting these impact determinations.
0081-13	The Summary and Comparison of Impacts Among Alternatives (Table ES-3) is unclear and confusing; each Impact rating for Alternatives B and C have multiple cells within a row, with no clear indication of what this means. Further, the grouping of C-1 and C-2, gives the public no ability to understand if one sub-alternative has less impact.	Table ES-3 summarizes the impacts of each alternative and the cumulative impacts of each alternative. Chapter 3 of the Draft EIS resource sections included detailed analysis supporting these impact determinations.

O.6 Form Letters

No form letters were received during the Draft EIS public comment period.

O.7 List of Commenters by Commenter Type and Submission Number

Table O.7-1: Federal Agencies

Letter Number	Commenter	Agency
0011	John W. Mauger, RADM	U.S. Coast Guard
0012	Michael Pentony	National Marine Fisheries Service
0013	Timothy Timmerman	U.S. Environmental Protection Agency

Table O.7-2: State Government

Letter Number	Commenter	Government Organization
0052	Lisa Berry Engler	Massachusetts Office of Coastal Zone Management

Table O.7-3: Local Government

Letter Number	Commenter	Government Organization
0056	Gordon M. Carr	New Bedford Port Authority

Table O.7-4: Businesses and Organizations

Letter Number	Commenter	Organization
0004	N/A	Island Wind, Inc.
0006	N/A	ECOncrete
0010	N/A	Rhode Island Environmental Education Association
0023	Susanne H. Conely	Save Greater Dowses Beach
0025	Erik Peckar	Vineyard Power
0027	Jennifer Menard	Bristol Community College
0028	Andrew Gottlieb	Association to Preserve Cape Cod
0032	John L. Cox	Cape Cod Community College
0041	Katie Almeida	The Town Dock
0055	Thomas A Nies; Dr. Christopher M. Moore	New England and Mid-Atlantic Fisheries Management Councils
0059	N/A	Maria Mitchell Association
0064	Robbin Orbion	Cape Cod Technology Council

Table O.7-5: Individuals

Letter Number	Commenter	Form Letter or Other Applicable Information
0003	Meghan Gombos	N/A
0005	James Paterson	N/A
0007	Michael Jacobs	N/A
0008	Ann Berwick	N/A
009	William Lake	N/A
0015	Michelle Jones	N/A
0016	Dr. Steve Waller	N/A
0018	Ken Lambert	N/A
0019	Scott Mclane	N/A
0020	Ron Dagostino	N/A
0021	Anonymous	N/A
0022	Carol Zais	N/A
0024	Jeffrey Kominers	N/A
0029	Maria Gerdy	N/A
0031	Greg Gerdy	N/A
0033	John Hauser	N/A
0034	Denise Toomey	N/A
0035	Anonymous	N/A
0036	Joseph Toomey	N/A
0037	Anonymous	N/A
0038	Beth Melchiono	N/A
0039	Hailey MacDonald	N/A
0040	Brian Koelbel	N/A
0042	Brian Morrison	N/A
0043	Dr. and Mrs. Joseph Conway	N/A
0044	Jane E Hattemer-Stringer	N/A
0045	Anonymous	N/A
0046	Dr. and Mrs. Joseph Conway	N/A
0047	Peter Hansen	N/A
0048	Anastasia Guenther	N/A
0049	Anonymous	N/A
0050	Joanne Carota	N/A
0051	Lynn Wilson	N/A
0053	Christopher Mutti	N/A
0054	Susan McLean	N/A
0057	Mary MacMillan	N/A
0058	Anonymous	N/A
0060	Jack & Wendy Cohen	N/A
0061	Susan Truitt	N/A
0062	Maureen Murphy	N/A
0063	Mary Linn	N/A
0065	Claire O'Connor	N/A
0068	Cynthia Harris	N/A
0073	Kerry E. Sullivan	N/A

Letter Number	Commenter	Form Letter or Other Applicable Information
0074	Maria Gerdy	N/A
0082	Bob Schulte	N/A
0084	Christine Meade	N/A
0086	Thomas Humick	N/A
0095-1	William Lake	N/A
0095-2	Noelle Pina	N/A
0095-3	Susanne Conley	N/A
0095-4	Susannah Hatch	N/A
0095-5	Peter Silva	N/A
0095-6	Mike Okoniewski	N/A
0096-1	Susanne Conley	N/A
0096-2	Carl Van Warmerdam	N/A
0097-1	Mike Okoniewski	N/A
0097-2	Susanne Conley	N/A
0097-3	Van Warmerdam	N/A
0097-4	Erik Peckar	N/A
0097-5	Gary Yerman	N/A

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U.S. Department of the Interior (DOI)

The DOI protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors the Nation’s trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

Bureau of Ocean Energy Management (BOEM)

BOEM’s mission is to manage development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way.

BOEM
Bureau of Ocean Energy Management